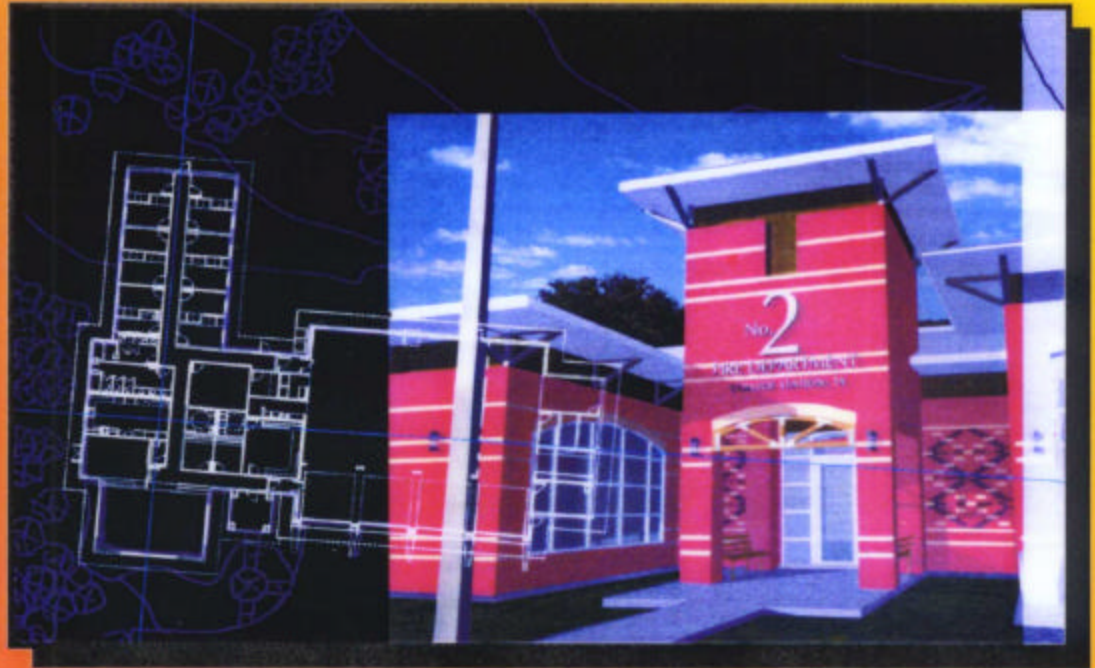


# College Station Fire Department



## Fire Protection Master Plan

# **Fire Protection Master Plan**

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## MISSION STATEMENTS

The College Station City Council has adopted a mission statement and eight vision statements that represent the goals the Council has for the City. These goals serve as the guiding principles for the Council and City employees to follow in their daily tasks.

The mission statement reads:

***On behalf of the citizens of College Station, a unique community and home of Texas A&M University, the City Council will promote the safety, health and general well-being of the community within the bounds of fiscal responsibility while preserving and advancing the quality of life resulting in exceptional civic pride.***

The eight vision statements read:

*As a result of our efforts, citizens will:*

- *Access the highest quality of customer focused city services available at reasonable cost.*
- *Live in a safe, secure and healthy environment.*
- *Live in a clean environment that enhances and protects the quality of their lives.*
- *Be enriched by a range of cultural arts and recreational opportunities provided through citywide initiatives and collaborative efforts.*
- *Participate and contribute to the health and future of our community.*
- *Easily travel to, within and from the community.*
- *Contribute to and benefit from living in a strong and diverse economic environment.*
- *Live in well-planned neighborhoods suited to community interests and lifestyles.*

In support of these Vision Statements, the College Station Fire Department has adopted a mission statement that reads:

***The College Station Fire Department will strive to provide cost effective, high quality Fire Suppression and Emergency Medical Services while providing non-emergency Fire Prevention, Code Enforcement, Public Education and Support Services to the community.***

## **Executive Summary**

The College Station Fire Department is facing many challenges relating to delivery of services to our citizens. Even though no major annexation is anticipated for several more years, investment in undeveloped areas within the current city limits will place even greater demands on all city departments' resources.

The change from the Key Rate System for evaluation of local fire suppression capabilities to the Insurance Services Office, Inc., (ISO) *Fire Suppression Rating Schedule* greatly alters the criteria under which the Fire Department has been scrutinized. Under ISO, Texas A&M University System property (which accounts for approximately 30% of our primary response area) will have a major impact on our fire department's rating. As ISO evaluation can have a direct impact on citizens' insurance rates, it is the responsibility of the fire department to strive to meet ISO criteria.

In order to meet these challenges, the fire department recommends the following changes over the next ten years:

- Construction and activation of Fire Station 5 as per the current CIP.
- Implementation of a dedicated ladder company.
- Construction and activation of Fire Station 6 to meet service demands in the eastern portion of the city.
- Construction and activation of Fire Station 7 to meet service demands in the northern portion of the city.
- Relocation of Fire Station 3 to a site west of current location as development and service demand dictates.
- Implementation of a 4<sup>th</sup> first line ambulance.
- Implementation of a Special Operations Squad.
- Implementation of a second dedicated ladder company as development dictates.
- Implementation of a District Chief Position when department staffing dictates.

It is also recommended that the City establish communication guidelines with the City of Bryan, Brazos County, the Brazos County volunteer fire departments and Texas A&M University concerning fire station location and activation throughout the local area. Coordination in facilities planning would help to lessen "overlap" of response areas and allow more efficient use of all entities' resources. There is the possibility that "joint use" facilities could provide service to areas along our common boundaries. A properly placed cooperative facility could enhance service delivery to the main campus and areas of our City and the City of Bryan. Cooperation of this type would benefit all the citizens of Brazos County.

We feel that these recommendations would allow the fire department to maintain the current ISO Public Protection Classification (PPC) of 3 and place us in a position to achieve a PPC of 2 in the future.

Cost of implementation of these recommendations over a ten-year timeline would be as follows:

<b>Capital Expense</b>	<b>Fire Suppression</b>	<b>EMS</b>	<b>TOTAL</b>
Facilities	\$3,150,000	\$1,350,000	\$4,500,000
Apparatus and Equipment	\$1,523,000	\$652,500	\$2,175,000
Sale of Current Station 3 facility			<\$500,000>
<b>Total</b>			<b>\$6,175,000</b>
<b>Operation and Maintenance</b>			
Facilities	\$151,200	\$64,800	\$216,000
Vehicles (including replacement)	\$426,370	\$172,730	\$599,100
<b>Total Over 10 Year Implementation</b>			<b>\$815,100</b>
<b>Personnel</b>			
	\$12,788,300	\$5,480,700	\$18,269,000
<b>Total Over 10 Year Implementation</b>			<b>\$18,269,000</b>
<b>Grand Total over 10 Years</b>	<b>\$18,038,870</b>	<b>\$7,720, 730</b>	<b>\$25,759,100</b>

# Introduction

## The Need for a Fire Protection Master Plan

Not since 1991 has the College Station Fire Department completed a comprehensive assessment of itself with the purpose of developing a plan for delivery of services to the community<sup>1</sup>. The risks encountered in the community have been evaluated. Operational deficiencies that impede effective and efficient service delivery to such risks have been identified. A long-range action plan of goals to be achieved to improve service delivery has been formulated. This document will express these concerns, with solid criteria attached, to the policy makers and political leaders of our community. With the transition from the Key Rate System for evaluation of local fire suppression capabilities to the Insurance Services Office (ISO)<sup>2</sup> evaluation criteria, a critical analysis of the challenges faced by the fire department and the most effective means of meeting these challenges is vital. This **Fire Protection Master Plan** includes such an assessment and plan development, and more.

The community profile of the City of College Station has changed in recent years and continues to change at an accelerating pace. Fire and emergency medical services must also change in order to keep pace with the community risk. In an effort to provide better information to policy makers and our political leaders relative to essential service level improvements, the Fire Chief and City Manager committed to the development of a **Fire Protection Master Plan**. The master planning process began in late October of 1998. Several surveys were administered to citizens and all department employees. The results were compiled and analyzed and the results were the topic of meetings held with all personnel. The Master Planning team was assembled and conducted their first meeting June 02, 1999, and have been meeting on a regular basis since that time.

## The Master Planning Process

In order to understand the operation of the College Station Fire Department, and to realize operational impediments that prevented effective service delivery to a growing community, the Master Planning Team analyzed the department's operation through various means:

- Operational data was researched by the Master Planning Team relative to operational standards and practices of fire and emergency medical service departments throughout Texas and the United States.

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<sup>1</sup> "Concepts and Considerations for Strategic Planning", Chief Richard Orange, May 1991

<sup>2</sup> The Insurance Services Office is an independent organization that provides information to insurance underwriters that is used to set policy premium rates for specific service areas. Currently 45 states participate under the ISO fire protection rating system.

- Mandated services were identified and current delivery levels were analyzed.
- Expectations of the department's internal and external customers were researched and analyzed.
- Future demand for services was projected from growth expectations obtained from other city departments and external sources.
- Data relative to current department apparatus deployment capabilities (fire and EMS) along with response history based on fire demand zone information was reviewed and analyzed.
- Various options in achieving cost effective service delivery in a period of dynamic community change were compiled and studied.
- A comprehensive long-range plan of improvement for the fire and emergency medical services for the City of College Station was developed. Specific recommendations are included in this **Fire Protection Master Plan**.

### **Fire Protection Master Plan Contents**

As a result of the comprehensive review of fire and emergency medical services serving the City of College Station, the **Fire Protection Master Plan** includes:

- An overview of the current resources and personnel providing fire protection and emergency medical services to the City of College Station.
- The tactical response capabilities of engine companies responding from current fire station locations and the response deficiencies that will continue to exist if improvements are not made in engine company and ladder company deployment from future station locations.
- An analysis of short and long term fire prevention, fire protection, community enhancement/code enforcement, and emergency medical service needs.
- An overview of the various levels of improvement that can be made and the associated costs, as well as definitions of the benefits of such options.
- A long term implementation strategy and action plan to realize success in the Master Planning process.

### **Executive Summary**

As a result of the commitment by the Master Planning Team, a comprehensive assessment of fire protection and emergency medical services has been completed. As part of the **Fire Protection Master Plan**, specific recommendations by the Master Planning Team are contained within the Plan. The recommendations serve to provide an implementation strategy and action plan

for improving fire protection and emergency medical services in the City of College Station over the next decade. The recommendations serve to focus on six predominant areas of improvement:

- **Improved life safety for the community.**
- **Reduced risk of property damage from fire.**
- **Reduced response time by fire and emergency medical companies.**
- **Improved safety for our firefighters.**
- **Better recruiting opportunities and retention of personnel.**
- **Greater commitment to fire prevention, public education, and risk management.**

The **Fire Protection Master Plan** reflects the most comprehensive analysis of the City's fire protection and life safety system that has ever been undertaken. As the community changes, the **Fire Protection Master Plan** must also change. It is the recommendation of the Master Planning Team that the Fire Chief and his staff review the **Fire Protection Master Plan** every two years and revise as necessary, with a full evaluation and revision performed every five years.

The following points summarize the recommendations of the Master Planning Team:

1. Fire Station Locations: Analyzes the impact of Engine Company, Ladder Company, and Ambulance response time and drive distance in providing fire and emergency medical service to the community, and the need to maintain a five (5) minute response time (3.5 minute drive time) to 90% of our population. This recommendation is consistent with the need to provide an adequate public facilities plan for the community by planning additional stations when a developing area outside the 5 minute response time exceeds more than 2.5 miles in area.
2. Fire Apparatus and Equipment Acquisition and Replacement: Supports the concept of a strong fire and emergency medical service response system that includes modern apparatus that are safe and functional for the response of department personnel.
3. Emergency Medical Services: Provides strong support for the delivery of *advanced life support* by any department company.
4. Fire Prevention/Code Enforcement Staffing: Fire prevention code inspection, public education, plan review, and premise code enforcement demands are escalating. The staff increases included in this plan will improve the safety of the community, diminish the potential of fire in commercial occupancies, reduce the risks to which firefighters are exposed, and enhance the appearance of neighborhoods and the community as a whole.

Once adopted by the City Council, the more pressing issues in the *Fire Protection Master Plan* will be incorporated into the City of College Station



Comprehensive Plan. The *Fire Protection Master Plan* will serve as the framework for the College Station Fire Department in future years as fire protection and emergency medical service challenges change.

### **The College Station Fire Department**

The College Station Fire Department was established in 1970 and served a population of approximately 17,000 citizens. Today the department serves a population of approximately 66,200<sup>3</sup> citizens and covers a primary response area of over 40 square miles, which includes fire suppression services for Texas A&M University. TAMU has a student population of 43,000 (approximately 10,000 live in on-campus housing) and a work force of approximately 23,958 employees<sup>4</sup>. The College Station Fire Department also provides ambulance service to the southern half of Brazos County. The City enjoys a Class 3 rating by the Insurance Services Office.<sup>5</sup>

The department operates 4 fire stations with a minimum of 19 personnel on duty at all times. These personnel staff three engines and one quint (3 person crews), three ambulances (2 person crews), and one command vehicle (1 person). Maximum staffing is 24 personnel per shift.

There are three personnel assigned to the Prevention Division of the Fire Marshal's Office that provide public fire and life safety inspection, fire cause determination and arson investigation, plan review, and public education. Also assigned to the Fire Marshal's office are three Community Enhancement/Code Enforcement Officers and 5 full-time equivalent parking officers. There are two personnel assigned to operations training functions: a Fire Training Coordinator and an EMS Training Coordinator.

The remaining staffed positions in the fire department consist of the Fire Chief, Assistant Fire Chief, Fire Marshal, Public Information Officer/Research and Planning Coordinator, staff assistant, senior secretary, and secretary.

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<sup>3</sup> Estimates of City population vary from 62,872 permanent residents (C. of C.S. Economic and Community Development Office, 1998) to 70,400 permanent residents (serial zone map land use inventory population estimate as of 12-01-99).

<sup>4</sup> TAMU Employment Office reports 10,558 part-time and full-time employees and approximately 13,400 student workers.

<sup>5</sup> The Insurance Services Office evaluates the fire defense capabilities of a City and assigns a Public Protection Classification (PPC), Class 1 being the best protection and Class 10 being an absence of protection relative to public fire defense capability.

## Planning Considerations

### Fire and Rescue Costs and Benefits

One measure of the cost effectiveness of service delivery by a public agency is the *per capita* cost of providing such services. The following depicts the per capita cost of providing **fire and rescue** services to the citizens of College Station:

FY '00 Fire Department Budget	\$5,162,697.00
Less EMS Costs	<1,517,630.00>
Less Community Enhancement costs	< 104,453.00>
Net FY '00 Fire Suppression and Prevention Costs	\$3,540,614.00

### Per Capita Fire Suppression/Prevention Cost<sup>6</sup>

When comparing the **\$53.48** *per capita cost of service delivery* in the City of College Station for fire suppression/prevention services to other comparable population group cities (50,000 to 99,999) or to comparable cities in our geographic division (West South Central) from the chart below<sup>7</sup>, it can be seen that the per capita cost of such services are comparatively low.

### Total Department Expenditures- Fire

Classification	No. of cities reporting	Mean (\$)	Per capita (\$)
Total	1,065	4,701,327	87.83
Population Group			
Over 1,000,000.....	3	206,974,167	106.49
500,000-1,000,000....	6	73,132,266	105.57
250,000-499,999.....	14	27,813,760	79.19
100,000-249,999.....	67	15,596,224	100.83
<b>50,000-99,999.....</b>	<b>142</b>	<b>6,171,056</b>	<b>92.05</b>
25,000-49,999.....	275	3,256,514	92.03
10,000-24,999.....	558	1,328,004	83.04
Geographic Division			
New England	69	3,665,988	91.47
Mid-Atlantic	71	2,816,699	70.57
East North Central	223	3,647,399	94.18
West North Central	95	3,218,865	66.55
South Atlantic	159	4,435,844	96.92
East South Central	68	4,137,715	100.56
<b>West South Central</b>	<b>133</b>	<b>4,601,135</b>	<b>80.37</b>
Mountain	62	7,031,507	94.08
Pacific Coast	185	7,568,889	87.13

<sup>6</sup> Based on an estimated City population of 66,200 permanent residents (C. of C.S. *Approved Budget for Fiscal Year October 1, 1999 to September 30, 2000*, p. H-7)). Serial zone map land use inventory population estimate as of 12-01-99 is 70,400.

<sup>7</sup> Information obtained from the **International City/County Management Association** (*1999 The Municipal YearBook*, p. 129) Figures reflect *fire suppression* costs only and do not address EMS.

With the inclusion of budget expenditures associated with delivery of emergency medical services, the per capita cost for fire department operation is still below means, at **\$75.86**.

When comparing the per capita cost of providing fire prevention and suppression services in College Station cities with similar populations, the College Station Fire Department operates at approximately 61% of the cost of comparable fire departments nationwide and at approximately 70% of the cost of those within our geographic division. Including EMS service delivery, the figures are 84% and 97%, respectively. The cost comparison for the Fire Department is low, in part, because such services have not kept pace with the dynamics of the community.

Specific cities with similar population bases were contacted. All provide service to major universities. Of the sample cities surveyed, 50% provided ambulance transportation and one provided no emergency medical services at all. The remainder provided "first responder"<sup>8</sup> EMS services to citizens. A list of the cities and a sample survey is included at the end of this report.

Populations ranged from 37,180 to 93,000 with a mean of 65,090 and an average of 64,982. Per capita expenditures for fire suppression and prevention (exclusive of costs associated with providing emergency medical services) ranged from \$71.09 to \$95.23, with a median of \$83.16 and an average of \$79.34. Budget figures from those departments that also provide EMS transport service yielded per capita expenditures ranging from \$75.86 to \$109.87, with a median of \$92.86 and an average of \$91.91. Of the ten cities surveyed, College Station ranked seventh in total per capita expenditures at \$75.86.

Compared to all respondents to the survey, the per capita expenditures of the City of College Station for fire suppression and prevention services is 67% of the average and 64% of the mean. Comparison to respondents that provide EMS transport, as well as fire suppression the figures are 82.5% of average and 81.7% of mean.

After adjusting for regional cost of living and other economic factors, expenditures are as follows: average for total budget- \$79.76 per capita (College Station- \$75.86 or 95%); average of fire suppression budget only- \$74.29 (College Station- \$53.48 or 72%).

There appears to be definite relationship between per capita expenditures and ISO PPC<sup>9</sup>. The survey cities with the highest per capita expenditures, Champaign, IL (\$95.23) and Lawrence, KS, (\$109.87) also have the highest ratings in the sample- PPC 2. The cities with the lowest per capita expenditures

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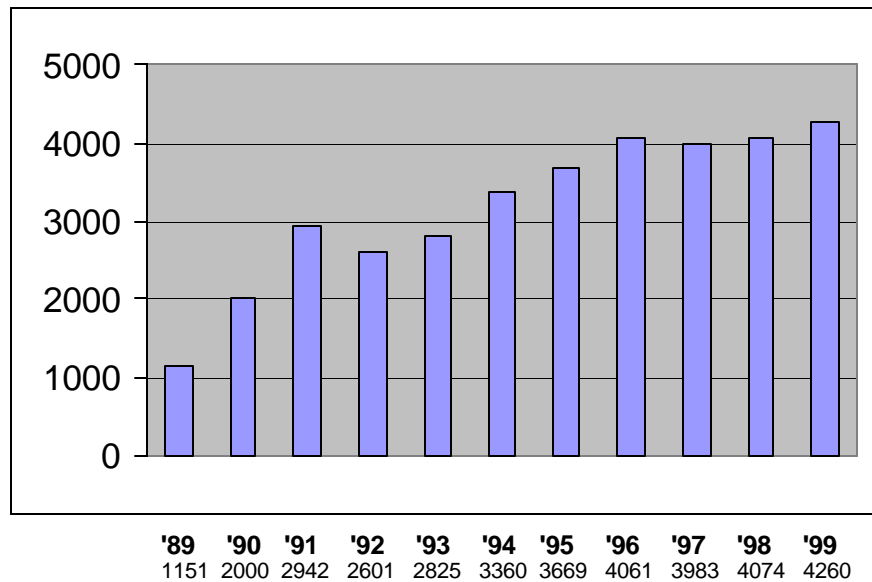
<sup>8</sup> Fire companies respond to provide emergency medical first aid until the EMS transport service provider arrives and patient care is transferred.

<sup>9</sup> Insurance Services Office, Inc., public protection classification.

for fire suppression and prevention services, Manhattan, KS, (\$60.68) and Stillwater, OK, (\$64.87) also reported the lowest ratings in the sample- PPC 4.

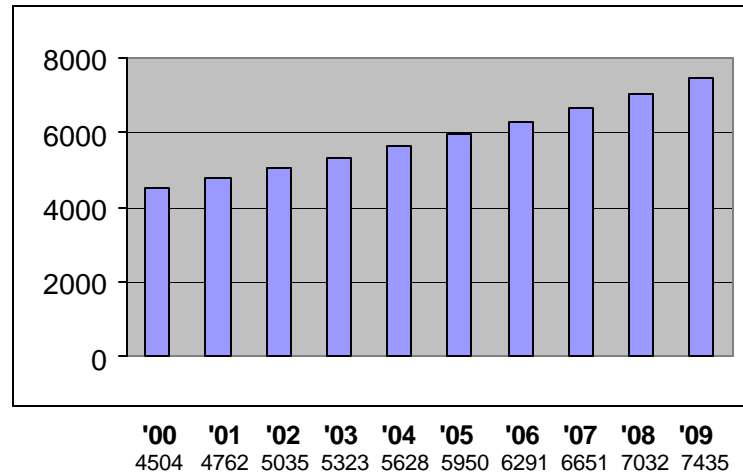
### **Emergency Response Call Volume**

An important element of fire protection and emergency medical service planning is based upon the emergency call volume history over a specific period of time. The following graph represents the previous ten years' call volumes.



From 1990 through 1999 demand for emergency service increased 113%. From 1995 through 1999 there was a 16% increase with an average increase per year, over ten years, of 5.73%.

Future call volumes can be projected based on population growth estimates and the previous ten years' call volume history (average annual increase of 5.73%) are represented in the following ten year projection.



Another analysis tool is evaluation of emergency activity by *fire response area* or *demand zone*. The map on the following page provides a pictorial scan demonstrating where greater or lesser demand for service is occurring in the city.

Conducting this analysis enables fire department staff to monitor changes in the call volume and response area history from year to year. When reviewing the data, it must be remembered that when deploying fire resources to emergency incidents engine, ladder and EMS companies respond from at least three fire stations or response districts. For example, a structure fire on Southwest Parkway would necessitate that the quint<sup>10</sup> and ambulance from Station 2, the engine from Station 4, and the engine and shift commander from Station 1 respond. This would place three of the city's four fire stations out of service. A subsequent fire emergency in the northern part of the city would necessitate either the engine from Station 3 (Highway 6 South) or an engine from the Bryan Fire Department (if available) respond, with a substantial delay in arrival. It can be seen how quickly the city's fire resources can be depleted. Upgrading the fire protection services consistent with the ***Fire Department Master Plan*** will substantially reduce this problem.

### Ladder Company Service

Another major planning consideration relates to the ability of companies in a first alarm assignment to reach all parts of a building with ladders in order to effect search and rescue operations of upper floors or carry out roof ventilation operations. As indicated in this document, a need exists to provide improved

<sup>10</sup> Quint- a fire apparatus, which has all the operational features of a fire, engine, plus an aerial ladder or other elevating device.

ladder operations in the early stages of the search and rescue and fire attack operations at structure fires. This document addresses the ladder company issue and recommends solutions that can be implemented in a phased approach: reestablishing a dedicated ladder company at Station 1 and the addition of a second ladder company at an appropriate station to provide ladder company service to the southern areas of the city.

## **Response Time**

The *Fire Department Master Plan* places significant emphasis on a 5-minute *response time*<sup>11</sup> (3.5-minute *drive time*)<sup>12</sup> for the first due engine or ambulance, followed quickly by ladder company arrival and support. The two maps on the following pages depict the areas of the City that are beyond the acceptable limit under the current 4.5 minute drive time and the 1.5 mile driving distance recommendation. Even with the activation of Station 5, significant areas of the city (approximately 50%) will be outside acceptable response criteria.

Suggestions for improvement included in this plan are additional and relocated fire stations.

## **Physical Barriers to Response**

The City of College Station, from a fire department emergency response aspect, is physically divided into three sections: a Central Section; a West Section separated by the Union Pacific Railroad tracks; and an East Section separated by Earl Rudder Freeway/ State Highway 6.

The railroad has only one grade separation and six grade-level crossings that are subject to being blocked by trains at any time. This currently causes periodic delayed responses and UPRR advises that railroad traffic will continue to increase from the current average of 14 trains per day to as many as 24 trains per day over the next several years, indicating that delayed responses will become more frequent.

Earl Rudder Freeway is a limited access highway with one-way access roads and only four grade separations. State Highway 6 is also limited access but, at this time, has two-way access roads and three grade separations. The Texas Department of Transportation (TXDOT) is very anxious to make these access roads one-way only, which will greatly affect emergency response from Station 3.

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<sup>11</sup> *Response time* includes *call processing time* (30 seconds), *reaction or turn out time* (60 seconds), and a 3.5-minute *drive time*.

<sup>12</sup> 3.5 minute drive time corresponds to ISO recommended 1.5 mile driving distance. Information obtained from NFPA 1142- *Standard on Water Supplies for Suburban and Rural Firefighting*, Appendix C-1.10, Table C-1.11 (b)

As the City becomes more aggressive in protecting neighborhood integrity with traffic calming projects and allows more "gated communities" there will be direct, adverse effects on emergency response by increasing driving times.

## **Risk Assessment**

A major consideration in the development of a fire protection master plan is an assessment of risk in the community. It is the intent of effective fire defense planning to provide a comprehensive fire protection program, made up of *proactive* as well as *reactive* service delivery capabilities. The following are abstract descriptions of the risks within our community:

**\*\* Risk:** Union Pacific Railroad is the largest transporter of hazardous materials directly through our community, traversing six at-grade crossings where the potential of a major problem exists. Annual reports from UPRR indicate that *thousands* of rail cars loaded with flammable and combustible liquids, flammable gasses, poisons, corrosives, cryogenic gasses and liquids, and other hazardous materials pass through the heart of our community on a regular basis.

**\*\* Risk:** The most important responsibility of any fire department is to deliver *proactive* services to the community such as fire prevention, code enforcement, and public education activities. Such programs confirm that commercial, institutional, industrial, health care and multi-family residential facilities are operating at minimum risk to tenants and visitors of the facilities, as well as to firefighters obligated to enter the buildings when an emergency exists. ISO recommendations are that all non-residential occupancies be inspected for fire and life safety code compliance two times each year. With current staffing and workload carried by the Office of the Fire Marshal, a majority of these occupancies are inspected on a 12 to 18 month cycle.

**\*\* Risk:** The number of residential and commercial buildings<sup>13</sup> whose heights exceed the maximum safe working height of ladders carried by fire department engine companies and also exceed the safe working height of the department's lone 75' aerial apparatus.

**\*\*Risk:** There are some emergencies that develop very rapidly, requiring considerable staffing strength in the early stages of the operation. Delayed rescue and fire attack operations can alter the positive outcome of such operations at the scene of a structure fire. ICMA surveys show that the mean number of full-time paid fire department *suppression* personnel for cities in our population group was 104 in 1998. Within similar size cities in our geographic region the mean was 87. The current

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<sup>13</sup> Actual count of structures over two stories in height shows in excess of 800 such structures within the fire department's primary response area.

average per 1000 population fell to 1.31 in 1998 after being very stable over the past decade at approximately 1.55. For our department to have the same ratio today we would need 87 suppression personnel (29 per shift.)

## **Cost/Benefit Analysis**

### **Impact of ISO PPC**

When the state changed from the key rate system of evaluating local fire suppression capabilities to the ISO<sup>14</sup> method for establishing public protection classification (PPC) the rules of the game changed. The ISO evaluation criteria stress different aspects of public fire suppression.

Insurance rates are directly related to PPC. A classification change of one level can relate to millions of dollars that residents, property owners, and business owners must spend for insurance coverage.

The College Station Fire Department currently enjoys a PPC 3 classification that was issued in 1988. Our community has grown greatly since then and reevaluation (which ISO prefers to conduct on a 10-year cycle) may have a large impact on local insurance premiums.

As the following pages illustrate, a one level PPC rate change could have significant impact on local insurance premiums. Over a five-year period, based on current estimates of premiums for insurance underwritten for our primary response area, a change from PPC 3 to PPC 4 could equate to cumulative **increase in insurance premiums of \$2.5 million**. A change to PPC 5 could mean an **increase of \$4.5 million**. Conversely, an improvement from PPC 3 to PPC 2 could mean cumulative **savings of \$2.9 million** over the same time period.

Obviously, these figures cannot represent the potential of property or lives saved. Reduced response times would allow companies to arrive at the scene of emergencies before conditions have deteriorated to a point where positive intervention would not be possible.

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<sup>14</sup> Insurance Services Office, Inc.



## **Fire Station Location and Apparatus Deployment**

There are seven factors which, in combination, predominately determine the emergency response capabilities of a fire department:

1. Station number and location
2. Apparatus and equipment
3. Staffing
4. Fire prevention and code enforcement
5. Firefighter training (mandated and department required)
6. Receipt of alarm/dispatch time
7. City, state, and federal regulations and mandates

The first factor is reviewed in this section of the ***Fire Protection Master Plan*** while *Apparatus and Equipment*, *Staffing*, *Fire Prevention and Code Enforcement*, *Firefighter Training* and *Receipt of Alarm/Dispatch Time* factors are reviewed in other sections of the plan. The impact of *City, state and federal regulations and mandates* are addressed as needed in various sections.

### **Station Number and Location**

Consistent with fire protection standards throughout the United States and the criteria used by the Insurance Services Organization (ISO),<sup>15</sup> the placement of fire stations in a community is the prime determinant affecting the *response time* of fire companies responding to fires, hazardous materials incidents, medical emergencies, etc. When considering that the fire companies spend approximately two-thirds of their 24 hour shift in the station, it is evident that station location must become the point of focus in calculating the anticipated *elapsed time* from the time the fire company receives the alarm until their arrival at the scene of an emergency.

There are a number of sequential operations that take place prior to the arrival of fire companies at the scene of the emergency when they begin their fire control operation or delivery of emergency medical skills to a patient. It is the approach of the Fire Department to compress, as much as reasonably possible, the time that is required in each of the sequential operations that affect the outcome of service delivery at the fire scene or location of the medical incident.

There are four (4) critical time span periods that must be considered in establishing the ability to attack building fires in their incipency prior to

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<sup>15</sup> The Insurance Services Office Commercial Risk Services, Inc. evaluates the fire defense capabilities of communities throughout the "United States for insurance rate setting purposes. The insurance underwriters utilize the ISO services in determining the cost of fire insurance in a given community.

*flashover*<sup>16</sup>, or commence with the delivery of medical care to the patient of a medical incident. The four time span periods are:

1. **Discover the Fire/Realization of a Medical Problem:** The time span that elapses between the inception of the fire, detection of the fire, and the time required to make initial contact with the fire department through the 911 system. For a medical related incident, it is the time that elapses when a person experiences a medical problem coupled with the time that is required to make initial contact with the Fire Department through the 911 system.
2. **Reporting of the Emergency:** The time span required to receive the alarm in the Dispatch Center, determine the appropriate Fire Department unit assignments and initiate their notification, and the actual movement of such resources out of the station(s) enroute to the emergency.<sup>17</sup>
3. **Responding Unit(s) Travel Time:** The response (drive) time of the Fire Department units assigned to the incident. The elapsed time span from the moment the *first-due company*<sup>18</sup> starts "rolling" from the station until its actual arrival time on the scene.
4. **Set-Up Time:** The time span required to actually "set up operations" where a full-scale fire attack operation by First Alarm<sup>19</sup> Companies has been initiated. On medical incidents, the time required to remove the medical equipment from the apparatus and begin patient care.

Fire protection standards throughout the United States and the criteria of the Insurance Services Office indicate that fire station placement should be consistent with the following fire company travel criteria:

- Engine Company: The built upon area of the City should have a *first due engine company* within 1 1/2 miles.
- Ladder Company: The built upon area of the City should have a *first due ladder company* within 2 1/2 miles.

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<sup>16</sup> *Flashover*: Ordinary combustibles and building materials have an ignition temperature of 400 degrees Fahrenheit to 1,000 degrees Fahrenheit. During fire conditions, heat from the growing fire is absorbed into the upper walls and the contents of the room, heating the combustible gasses and furnishings to their *auto-ignition temperature*. As a result of the radiation feedback of heat, the simultaneous ignition of all combustible material occurs, resulting in a flashover. In a matter of seconds, fire conditions produce a high level of superheated toxic gasses and fire spreads throughout the structure with dramatic speed.

<sup>17</sup> This can be subdivided into two time spans: Notification time- from receipt of call to initial notification of appropriate units; Turn-out time- from notification to units reporting that they are "responding."

<sup>18</sup> The Fire Company (specific type of apparatus and firefighters) that are scheduled to arrive *first* in a geographical area of the city in response to an emergency.

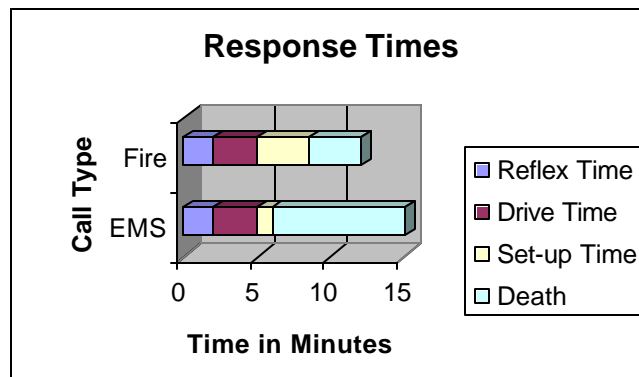
<sup>19</sup> The standard assignment of Fire Companies considered necessary to provide for an initial response and fire control effort at the scene of an emergency. In the College Station Fire Department, a First Alarm Assignment consists of two (2) Engine Companies, one (1) Quint Company, one (1) ambulance and one (1) command officer.

An *engine company* is a group of firefighters (usually 3) assigned to a fire department pumping apparatus. They are responsible primarily for providing water supply and attack lines for fire extinguishment. A *ladder company* (also referred to as a *truck company*) is a group of firefighters (usually 3-4) assigned to a fire department aerial apparatus. They are primarily responsible for providing search and rescue, ventilation, salvage and overhaul, forcible entry, and other fireground support functions.

In most areas, following these response criteria, strategically located fire stations can cover approximately **4-½ square mile area** of the city for each station<sup>20</sup>. If fire stations are properly located within the community consistent with the 1 ½ mile response criteria, services can be delivered to the calling party within 5 minutes from the time that the calling party makes contact with the 911 Center.

The unique geometry of our city, coupled with the lack of north/south traffic corridors and the barrier to emergency response imposed by Earl Rudder Expressway, makes it extremely difficult for strategically placed fire stations to cover more than 3 to 4 square miles.

For fires in buildings, it requires approximately 2 minutes to receive the emergency call in the Dispatch Center and initiate a response by the Fire Department<sup>21</sup>. **Under the 1 ½ mile response criteria, it will require approximately 3 to 3 ½ minutes to respond to the incident if it were located at the most remote point in the First Due Engine Company's 1 ½ mile response district.** It will require a minimum of approximately 3 ½ minutes for all companies in a First Alarm Assignment to set up operations for a fire attack function.

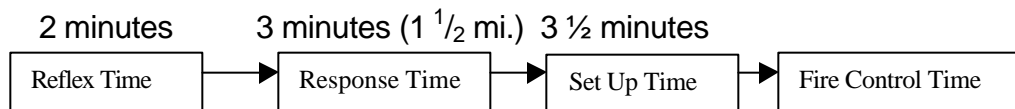


<sup>20</sup> Current College Station Fire Department stations must each cover approximately 10 square miles.

<sup>21</sup> This 2-minute time begins when the call for emergency assistance is initiated by a citizen and covers until the appropriate apparatus reports via radio to dispatch that they are responding. Obtaining the necessary information to ensure that the appropriate units are chosen and alerting the correct station takes from 45-60 seconds. The elapsed time from receipt of the alert at the stations until the appropriate units are physically in route takes 60-90 seconds.

Fire attack operations for engine companies, once they arrive on a scene of a building fire, would include the laying of water supply hoseline from the nearest hydrant to a position in close proximity to the building fire. Firefighters must don their personal protective equipment, including self-contained breathing apparatus. The hydrant supply hoseline and the fire attack hoselines must be prepared for waterflow. The fire attack group must reach the point of entry. These operational tasks take approximately three minutes and thirty seconds under ideal fireground operating conditions.

As illustrated in the *Fire Attack and Control* timeline below, if the engine companies are on their way enroute to the emergency with a *reflex time*<sup>22</sup> that does not exceed 2 minutes, and if the first due engine company does not have to travel more than 1 ½ miles to reach the building that is on fire, it will be able to remain within a 3 minute *response (drive) time*. If it does not take an excessive amount of time to position attack lines and firefighters prior to initiating fire attack operations, the first alarm assignment will be able to maintain a *set-up time* that does not exceed 3 ½ minutes. Only after all of the previous tactical operations have been realized can fire control efforts be started. If any one operation takes longer than the timeline below the outcome at the fire scene may not be as successful as desired.



Similar to the tactical necessity of having the nearest engine company arrive at the scene of a building fire within 5 minutes from receipt of the call by the 911 Center is an equivalent need to have the nearest ladder company arrive on the scene within 7 minutes<sup>23</sup> from receipt of the call from the 911 Center. The timely response and tactical deployment of ladder trucks (often referred to as “trucks” or “truck companies”) can not only affect the outcome of the fire and influence the safe removal of fire victims from the building, it has a tremendous impact on overall firefighter safety when such personnel are engaged in rescue and fire combat operations.

The first tactical responsibility of a ladder company at a building fire is to place the ladder truck in a position of tactical advantage near the fire building. Truck members must don their personal protective equipment, including self-contained breathing apparatus and select the tools for the job at hand. They must initiate search and rescue operations very quickly and place ladders for rescue and roof operations. Ventilation of fire gasses must be accomplished in order to reduce *flashover* potential and enable search operations to be carried out. Elevated fire

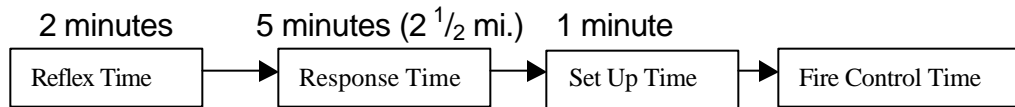
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<sup>22</sup> *Reflex time* - elapsed time from initiation of a call for emergency assistance by a citizen until the appropriate units report via radio to dispatch that they are in route.

<sup>23</sup> 2-minute reflex time and 5 minute drive (response) time, reflecting the 2 ½-mile response criteria for ladder companies.

streams must be strategically placed for effective exposure protection and a number of support operations must be carried out that are critical to the success of the engine company operating inside the fire building. Initiating forcible entry into the building for fire attack crews of the engine companies and opening walls and ceilings, confirming what conditions are like where the ladder company is operating (determining where the fire is located and where it is extending), cutting off the gas and electrical services to the building, property conservation and damage control operations are some of these support operations.

As illustrated in the *Ladder Company Set Up and Control* timeline below, a ladder company is on their way enroute to the emergency with a *reflex time* that is the same for the Engine Company (2 minutes). If the first due ladder company did not have to travel more than 2 ½ miles to reach the building that is on fire, it will be able to remain within the 5 minute *response (drive) time*. If it does not take the Ladder Company more than 1-minute *set-up time*<sup>24</sup>, their support operations to the Engine Company will be coordinated and timely with an aggressive fire attack and rescue effort.



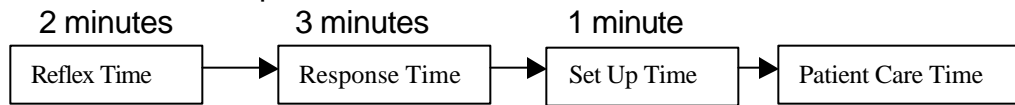
By strategically placing fire stations in the built upon area of the City following the 1 ½ mile response criteria for engine companies, a five minute response time can be maintained, thus assuring the prompt delivery of fire and rescue services. By adhering to these response criteria, initial fire attack and rescue efforts can begin within 8 to 8 ½ minutes from the time contact by the calling party with the Dispatch Center. As reviewed later in this report, beginning the fire attack and rescue operation within a maximum window of 8 to 8 ½ minutes is essential in preventing flashover, maximizing the survivability of the fire victim, assuring the safety of firefighters and minimizing property damage. This reinforces the importance of maintaining a five-minute response time as the maximum response time for the nearest Engine Company

For medical emergencies there is a parallel benefit to the patient by adhering to the 5-minute (1 ½ mile) response criteria for engine companies. It will require approximately 2 minutes from the time that the reporting party makes contact with the Dispatch Center until the nearest Engine Company or ambulance begins its response to the medical emergency. It requires approximately 3 minutes for the responding unit(s) to drive from the fire station to a medical emergency at the most remote point of its 1 ½ mile response district. It requires approximately 1-minute *set-up time* for personnel to set up operations at the medical incident and begin patient care. The following timeline for *EMS Calls* depicts the elapsed time

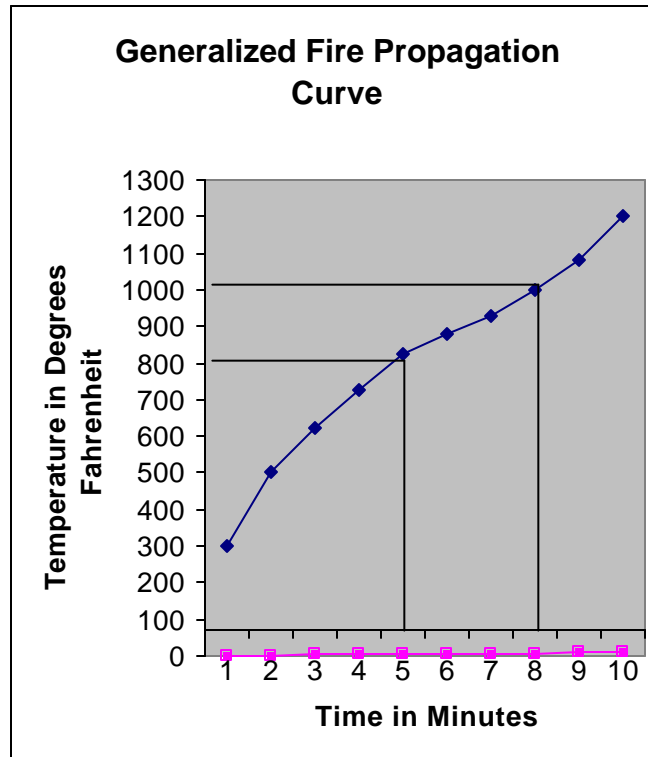
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<sup>24</sup> A one-minute set-up time for a ladder company does not reflect aerial operations, but functions to support initial interior attack by engine crews, such as forcible entry, utility control, and search and rescue tasks.

that is manageable by the Fire Department on medical emergencies if a maximum 5-minute response time is maintained.



By referencing the fire propagation curve (shown below), it can be seen that the tactical goal of the fire department is to have all fire companies assigned to the first alarm begin application of an adequate amount of water at critical points of attack to cut off fire extension and prevent *flashover*<sup>25</sup> from occurring.



Flashover is most likely to occur when the ambient temperature Reaches between 825°F and 1,000°F (5 to 8 minutes from initial ignition).

To be effective, such fire attack must occur *prior to 8 minutes*, or before interior conditions in the fire room reach 1,000 degrees Fahrenheit. In an analysis of fire company deployment, the importance of time is related to the exponential development and propagation of fire within a structure. Essentially, the fire growth rate relates to a fire **doubling in size every 17 seconds**<sup>26</sup>. Radiated

<sup>25</sup> *Flashover*: Ordinary combustibles and building materials have an ignition temperature of 400 degrees Fahrenheit to 1,000 degrees Fahrenheit. During fire conditions, heat from the growing fire is absorbed into the upper walls and the contents of the room, heating the combustible gasses and furnishings to their *auto-ignition temperature*. As a result of the radiation feedback of heat, the simultaneous ignition of all combustible material occurs, resulting in a flashover. In a matter of seconds, fire conditions produce a high level of superheated toxic gasses and fire spreads throughout the structure with dramatic speed.

<sup>26</sup> Fire Protection Handbook, 17<sup>th</sup> Ed., National Fire Protection Association, Section 6 "Confining Fires", Chapter 6 "Confinement of Fires in Buildings", p. 6-75

heat from the fire, in turn, heats adjacent combustible materials, thus further intensifying the fire. The violent expansion of the atmosphere in the fire room then forces the fire into uninvolved areas at a tremendous rate of speed.

Considering the exponential growth rate of fires, extended travel times significantly reduce the ability of firefighters to intervene in a timely manner at serious emergencies in preventing further deterioration of circumstances. The strategic planning effort of the most progressive cities is to provide for the careful distribution of fire companies throughout the city in order to minimize the occurrence of flashover and other deteriorating emergency conditions. The same holds true for medical emergencies where extended response times reduce the potential of saving the life of a patient suffering from a deteriorating medical condition. There are several areas of our city where it is not possible to deliver emergency fire and EMS services within the 5-minute response time:

- All areas north of the Raymond Stotzer Parkway/University Drive/Highway 60 corridor.
- Eighty percent of the area bordered by Texas Avenue, Francis Street, East University Drive and Bypass 6.
- Ninety percent of the areas east of Bypass 6.
- Eighty percent of the Texas A&M University Main Campus.
- Sixty percent of the TAMU West Campus.
- Areas south of North Graham Road and west of Schaffer Lane and Renee Lane.
- Areas west of Easterwood Airport.

### **Current Fire Department Resources**

The College Station Fire Department currently operates 4 stations from Administrative Offices at 1207 Texas Avenue.

The Administrative Offices were constructed in mid 1985. The approximately 4,000 square feet house the Fire Chief, Assistant Chief, Public Information/Research and Planning Office, Fire Prevention Division, Community Enhancement/Code Enforcement, and Parking Enforcement. The Fire Training Coordinator, EMS Training Coordinator, and Community Education Officer occupy offices in areas vacated by fire suppression forces when the current Station 1 was opened on Holleman Drive. An office for the Emergency Management Assistant is in this section of the building, adjacent to the City Emergency Operations Center.

Station 1, located at 304 Holleman Drive East was occupied in late October of 1997. This building has approximately 8,400 square feet and currently houses seven personnel per shift providing staffing for one engine, one ambulance, and

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one shift commander. This station was originally intended to house 4 additional personnel who staffed a ladder truck. This ladder truck was moved to Station 2 when Station 4 was opened at Easterwood Airport.

Moving suppression forces from the Texas Avenue location to the current Station 1 has created response deficiencies to areas from Lincoln Avenue north to the city limits. This includes the Spring Loop, Glenhaven and Chimney Hill areas, and most of the main TAMU Campus.

Construction of Station 2, located at 2100 Rio Grande, began in 1981, with the station being occupied in the spring of the following year. This 4,000 square foot facility was originally designed to house four personnel, currently houses 6 personnel per shift that staff one "quint" (an engine with an aerial ladder), and one ambulance. Because it is a 19-year-old facility, Station 2 has recently undergone a complete structural evaluation and plans are being developed to address structural deficiencies and to bring the station up to current recommended safety standards. This station, originally slated to be shut down when personnel and equipment were moved to open Station 4, remained open due to neighborhood support and was staffed with the ladder company from Station 1. **This required the department to eliminate dedicated ladder company service.**

Station 2 is geographically the department's most centrally located fire station.

Station 3, a 4,300 square foot facility, was staffed in December of 1994. Located at 4180 Hwy 6 South, this station houses 6 personnel per shift who staff one engine and one ambulance. Station 3 was staffed without an increase in department personnel. The Texas Department of Transportation plans to make the access roads for Hwy 6 South one-way in the very near future and this will definitely impact response times to sections of Station 3's response district.

Station 4, located at 1550 George Bush West (at Easterwood Airport), was occupied in March of 1999. This 10,000 square foot facility houses 4 personnel per shift who staff one engine. Easterwood Airport provides one person each day to staff an Aircraft Rescue and Firefighting (ARFF) vehicle. This facility is owned by the TAMU System and was constructed with funding from the Federal Aviation Administration (FAA) and the TAMU System. The College Station Fire Department does provide a portion of the operating and maintenance costs of this joint use facility.

Initially, personnel and equipment from Station 2 were to be moved to Station 4, with Station 2 being closed. Public concern kept Station 2 staffed, but necessitated the staffing of Station 4 with no increase in department personnel. The only option available to the department was to give up the service of a dedicated ladder company and move this apparatus and personnel to Station 2 where it now responds as a first due Engine Company.



The construction of Station 5<sup>27</sup> in FY '01-'02 will provide a significant improvement in the fire and EMS response coverage to the areas north and south of Green's Prairie Road and east of Highway 6 South. This area includes the Pebble Creek subdivision and "The Triangle" bordered by Hwy 6 South, Greens Prairie Road, and Rock Prairie Road.

With the improved response coverage due to construction of Station 5, approximately 50% of the area inside the city limits will be located outside the 5-minute response time for engine companies.<sup>28</sup> This 50% area coverage represents approximately 75% of the city's population. The Fire Department Master Planning Team is committed to better planning in the determination of the future fire and EMS facilities consistent with the needs of an adequate public facilities plan.

It is specifically recommended that the following emergency response goal be maintained in providing for the placement of future fire stations:

Maintain a five (5) minute response time to

**90% of the Population of the City of College Station.<sup>29</sup>**

The following benefits will be realized if response capabilities are improved to meet this goal:

- This will enable fire attack to begin prior to *flashover* conditions developing in a building fire.
- This will enable the arrival of the nearest available apparatus at the scene of a life threatening medical emergency incident and begin patient care within 4-6 minutes from the onset of the incident and prior to death or irreversible physiological injury.
- This will enable fire companies to arrive on the scene in a more timely manner at gas leaks, hazardous materials releases, water rescues, vehicle extrications, and other hazardous incidents where there is risk to the public or the environment where timely intervention can have a positive impact on deteriorating conditions.

The basic geometry of the City does lend itself to evenly spaced fire station placement. Many areas will experience rapid development while others will maintain their current population density for many years. It is not economically feasible to attempt to provide coverage within recommended criteria for 100% of

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<sup>27</sup> Integral to the activation of Station 5 is the addition of 12 personnel to fire suppression staffing and the purchase of an appropriate apparatus (engine or 100' ladder tower).

<sup>28</sup> A map illustrating coverage possible from a 5-station configuration is at the end of this section.

<sup>29</sup> 5 minute response time - 2 minute reflex time plus 3 minute drive time, meeting ISO 1 1/2 mile criteria

the city's incorporated area. To achieve even 90% area coverage would require resources to be placed at a minimum of twelve locations throughout the city.

We can, however, provide coverage within the recommended 5-minute response time to 90% or more of our resident population with resources responding from seven or eight locations. Options for fire station locations are illustrated at the end of this section.

To properly plan for the funding, site acquisition, architectural and engineering design, construction, apparatus purchase and personnel selection for implementation of an adequate public facilities plan, the Fire Department Master Planning Team supports the following recommendation:

1. Two additional stations to serve established areas that are outside acceptable response criteria.
2. Relocation of Station 3 west of its current location to better serve projected growth areas. The circumstance of the access roads of Highway 6 South becoming one-way will greatly hamper response from Station 3 at its current location.

Implementation of the above recommendations will significantly reduce the areas of the City where engine company response times exceed the 5-minute response criteria. As indicated previously in this report, 50% of the areas within the city limits with 25% of the resident population exceed the 5 minute response standard.

The areas denoted where the extended response times will be reduced to an acceptable standard by construction and activation of additional fire stations are:

- Areas north of the Raymond Stotzer Parkway/University Drive/Highway 60 corridor from Earl Rudder Freeway to Boyette Street.
- The area bordered by Texas Avenue, Francis Street, East University Drive and Earl Rudder Freeway.
- Areas east of Earl Rudder Freeway- Raintree, Emerald Forrest, Woodcreek.
- 80% percent of the Texas A&M University Main Campus.
- Areas south of North Graham Road and west of Schaffer Lane and Renee Lane.

It is estimated that the construction of such facilities and activation of the additional engine and ladder companies will reduce the area of the city that lies beyond the 5 minute response standard from the current 50% down to approximately 32% and provide acceptable coverage to more than 90% of the resident population. Additionally, such response standard improvements will enhance fire and EMS response capability throughout the entire City since:

- Engine companies currently serving those areas will not be leaving their assigned first-due response districts as often to serve such areas.
- Additional engine and ladder companies will improve the overall strength of the emergency services serving the City.
- Engine company distribution will be viewed favorably by the Insurance Services Office.

Options of this recommendation are offered in the section for the ***Fire Department Master Plan*** titled *Executive Summary*.

As build-out occurs at the perimeters of the city, reevaluation of engine company response capabilities must be conducted. The following is suggested as criteria in determining when additional fire stations should be considered:

- Maintain a 5-minute response/drive time (1 ½ mile drive distance) for engine companies to 90% of the resident population with a goal of covering 90% of the area within the city limits of the City of College Station.
- When a developing area with contiguous boundaries is located outside the 5-minute response profile for engine companies, planning of an additional station should take place when the developing area exceeds more than 2 ½ square miles in area.<sup>30</sup>

Adherence to these criteria will support the community need to maintain an acceptable emergency response standard for engine and EMS companies and prevent the problem that currently exists where long response times are being experienced by responding companies to significant areas of the City. It will also provide for a standard of fire protection facilities development that is consistent with an adequate public facilities plan.

Discussions have been held with the Bryan Fire Department concerning possible joint use facilities along the common city limit. Such a facility would appear to be one avenue for maximizing resource use for both cities. At this time, however, it appears that the main area of focus for expansion of the Bryan Fire Department is west of Harvey Mitchell Parkway.

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<sup>30</sup> This is based on the standard that the built upon area of the City should have a *first due engine company* within 1 ½ miles, and that an engine company can cover approximately a 3 to 4 square mile area of the city.

## Fire Apparatus and Equipment Acquisition

*Fire apparatus and equipment*<sup>31</sup> is the second factor that is reviewed in the **Fire Protection Master Plan** as it pertains to the emergency response capabilities of the College Station Fire Department. The other factors- *Station Number and Location, Fire Prevention and Code Enforcement, Firefighter Training, and Receipt of Alarm/Dispatch Time*- are reviewed in other sections of the plan. The factor associated with Staffing will be discussed in this section as well as the section on *Fire Prevention and Code Enforcement*.

## Apparatus and Equipment

In 1999, the College Station Fire Department responded to 4,260<sup>32</sup> calls for emergency service. At the moment that the Dispatch Center receives a 911 call from the person in need of aid, conditions at the scene are in a state of deterioration, and are worsening by the second. If the emergency is a building fire, **the flames are doubling in size every 17 seconds**<sup>33</sup> and pushing the fire closer to flashover. If the emergency is a hazardous materials release, the escaping material becomes a greater risk to people or the environment the longer it is unconfined. If the emergency involves someone who has been injured and trapped in a vehicle as the result of a motor vehicle accident, the less likely the person's life will be saved as time passes. If the emergency involves someone who is experiencing a life threatening medical emergency such as cardiac arrest, breathing difficulty, or a bleeding condition, the less likely that the person's life will be spared if emergency care provided by firefighters is delayed.

Of all the emergency services delivered by the Fire Department, it is the potential of a *fire in a structure* that places the greatest demand on the fire protection and life safety system. Successful protection of lives and property from fire is *directly dependent* upon the response of an adequate number of firefighting vehicles, from strategic locations throughout the City, supported with a sufficient number of firefighters, that will enable a positive impact on the deteriorating conditions at the scene of an emergency. This is especially true when fires are not controlled in their early stage and progress to a point that flashover occurs and the fire spreads from its room of origin to a point that the entire structure becomes involved and threatens neighboring structures as well. In such situations, it is the tactical deployment of firefighters, utilizing modern and reliable firefighting apparatus and equipment that determines the eventual outcome of a fire.

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<sup>31</sup> As used in this context, *apparatus* refers to the fire engines, ladder trucks, rescue vehicles, ambulances, and support vehicles used by the firefighters; and *equipment* refers to the nozzles, hydraulic rescue tools, self-contained breathing apparatus, fire extinguishing devices, fans, portable ladders, electrical generators and lights, hose and fittings, etc., that is carried on the firefighting apparatus and used by firefighters at the scene of an emergency.

<sup>32</sup> This represents an increase of approximately 9.6% over the 4,074 calls for emergency service answered in 1998.

<sup>33</sup> Fire Protection Handbook, 17<sup>th</sup> Ed., National Fire Protection Association, Section 6 "Confining Fires", Chapter 6 "Confinement of Fires in Buildings", p. 6-75

Across America, there are two primary types of firefighting vehicles that are used by firefighters in controlling fires in buildings: engines and ladder trucks. There are a variety of *support vehicles*<sup>34</sup> used by firefighters to support the fire attack and control efforts of firefighters operating the engines and ladder trucks, but the engine and the ladder truck are the backbone of any firefighting effort.

**ENGINE COMPANIES:** An engine is a vehicle designed with a fire pump capable of pumping 750 to 2,000 gallons of water per minute when connected to a continuous water supply; a water tank that will carry 500 to 1,000 gallons of water on board where mobile firefighting is required; and 1,500 to 2,000 feet of supply/attack hose. The engine also carries a 24' ladder as well as roof and attic ladders, and a variety of other firefighting tools and equipment used by firefighters in controlling a fire. Staffed with a given number of firefighters, the unit is referred to as an *engine company*. Fire attack operations for engine companies would include the laying of a water supply hoseline from the nearest hydrant to a position in close proximity to the building fire. Firefighters then don self-contained breathing apparatus, prepare the hydrant supply hoseline and fire attack hoselines for waterflow, and prepare for entry into the fire building. The Engine Company would advance hoselines to tactical positions to cut off fire extension to adjacent exposed buildings and to other rooms or floors within the fire building and extinguish the fire. As with all other companies operating on the fireground, engine companies would initiate search and rescue efforts as they move through the building, but it is the prompt placement of hoselines that ensures the safety of fire victims until they can be located and removed to an area of safety. An Engine Company would also be assigned as a Rapid Intervention Crew.<sup>35</sup>

The College Station Fire Department operates an engine company out of Stations 1, 3, and 4; each staffed with a minimum of three personnel. A “quint” (an engine with an aerial ladder) operates out of Station 2, staffed with a minimum of three personnel.

**TRUCK COMPANIES:** A ladder truck is a vehicle designed with a hydraulically raised ladder that provides the dual function to firefighters of allowing access to higher levels of a building, as well as providing an elevated master stream for fire control purposes. Ladder trucks (often referred to as “trucks” or “truck companies”) are also designed with large amounts of compartment space to enable the apparatus to carry a great deal of specialized equipment that cannot be carried by the engine companies. Trucks carry a complement of portable ground ladders, fans for smoke removal, electrical generators, lighting

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<sup>34</sup> Support vehicles or apparatus would include rescue squads, hazardous materials units, special operations vehicles, command vehicles, etc.

<sup>35</sup> A Rapid Intervention Crew consists of at least 2 members and will be available for rescue of a member or team if the need arises. Rapid intervention crews are fully equipped with the appropriate personal protective equipment (including self-contained breathing apparatus) and any specialized rescue equipment that might be needed given the specifics of the operation underway.

equipment, a wide variety of hand tools and rescue equipment, forcible entry tools, as well as salvage/property conservation/overhaul equipment.

The tactical responsibility of a Truck Company at a building fire is to place the ladder truck in a position of tactical advantage near the fire building. Truck company members don self-contained breathing apparatus and, with the appropriate tools in hand, force entry into the building for the engine companies. The truck members immediately begin search and rescue operations<sup>36</sup> while the engine companies advance fire streams into the building to control the spread of fire. Truck members also terminate the electrical/gas service to the building; place ladders for rescue and roof operations, provide ventilation of fire gasses to reduce the chance of flashover and to enable rescue operations to be carried out; provide support to engine companies by opening walls and ceilings, as well as provide powerful elevated water streams for exposure protection and fire control. The proper utilization of truck companies can not only affect the outcome of the fire and influence the safe removal of fire victims from the building, but also has a tremendous impact on overall firefighter safety when they are engaged in rescue and fire combat operations.

The College Station Fire Department does not operate a dedicated ladder company. A “quint” (an engine with a 75’ aerial ladder) operates out of Station 2, staffed with 3 personnel, and may assume either engine or ladder company responsibility as required. Staffing Station 4 with no additional personnel forced us to discontinue the practice of providing dedicated ladder company service.

**SUPPORT APPARATUS:** The College Station Fire Department operates two types of specialized support apparatus:

- Command Vehicle- Assigned to Station 1 and staffed by a battalion chief/shift commander.
- Special Operations Trailer- Assigned to Station 1 and not staffed. This is a special-call vehicle and is staffed on demand only for operations such as major hazardous materials incidents, technical rescue operations, or any protracted incident where rehabilitation of on-scene personnel is warranted.

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<sup>36</sup> While carrying out search and rescue efforts, truck members are not encumbered by hoselines and can move quickly throughout the fire building in their attempt to locate and remove trapped or overcome victims.

**FIRE COMPANY RESPONSE STANDARDS:** According to the National Fire Protection Association, the following response standards apply to fire departments involved in initial interior attack operations:

#### TYPICAL INITIAL ATTACK RESPONSE STANDARDS<sup>37</sup>

**High-Hazard Occupancies:** (Schools, hospitals, nursing homes, explosive plants, refineries, high-rise buildings, and other high life hazard or large potential occupancies)

At least four (4) engines, two (2) ladder trucks (or combination apparatus with equivalent capabilities),<sup>38</sup> two (2) chief officers, and other specialized apparatus as may be necessary to cope with the combustibles involved; not less than twenty-six (26) firefighters and two (2) chief officers.

**Medium-Hazard Occupancies:** (Apartments, offices, mercantile and industrial occupancies not normally requiring extensive rescue or firefighting forces)<sup>39</sup>

At least three (3) engines, one (1) ladder truck, one (1) chief officer, and other specialized apparatus as may be needed or available, not less than eighteen (18) firefighters and one (1) chief officer.

**Low-Hazard Occupancies:** (One-, two-, or three-family dwellings and scattered small businesses and industrial occupancies)

At least two (2) engines, one (1) ladder truck, one (1) chief officer, and other specialized apparatus as may be needed or available; not less than fourteen (14) firefighters and one (1) chief officer.

**Rural Operations:** (Scattered dwellings, small businesses, and farm buildings)

At least one (1) engine with a large water tank (500 gallons or more), one (1) water tender (1,000 gallons or more) and such other specialized apparatus as may be necessary to perform effective initial attack firefighting operations; at least fourteen (14) firefighters and one (1) chief officer.

By operating consistent with the *Initial Attack Response Standards* as defined by the National Fire Protection Association, fire attack and rescue resources will be capable of initiating a strong fire attack, confirm the location and safe removal of fire victims, prevent the spread of fire to exposed buildings, and effectively control the fire with minimal risk to firefighters.

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<sup>37</sup> This is assuming that engine and ladder companies will be involved in interior attack and operational response functions.

<sup>38</sup> Such as pumper/aerial apparatus, “quints”, elevating platforms, etc.

<sup>39</sup> The majority of responses made by the College Station Fire Department to reported structure fires falls in this category.

**OPERATIONAL CONCERNS:** There are currently a number of operational deficiencies relative to fire company response and deployment that could be improved by careful consideration of the long range apparatus and equipment acquisition and replacement program.

**DEFICIENT LADDER TRUCK RESPONSE:** Due to lack of staffing and apparatus, the College Station Fire Department does not provide dedicated ladder truck company response that is consistent with the Insurance Services Office standard:

*“The built upon area of the city should have a first due ladder within 2-1/2 miles.”*

Not having a dedicated ladder company respond on all building fires as part of a first alarm assignment necessitates that the engine company personnel not only carry out their engine company functions (such as advancing hose lines, cutting off fire extension, extinguishing the fire, etc.), but they must also carry out the truck company functions (such as search and rescue, ventilation, ladder operations, utility control, etc.). If the ladder truck does not arrive at the scene in a timely manner, the benefit of its use is seriously compromised. **It is also important to remember that the functions performed by a truck company and the ladders and equipment carried on the ladder truck are needed on every building fire, not just taller buildings.**

A survey of our primary first response area shows a large number of buildings where the roof or upper floors of those specific buildings are beyond the reach of the ladders carried on the engine companies in a first alarm assignment.<sup>40</sup> As a result, firefighters cannot access all parts of the building unless a ladder truck staffed to perform ladder company functions responds to the scene. If the quint assigned to Station 2 is on another call when a structure fire alarm is received, or if the structure fire is in District 2 and the quint is utilized as the first due engine, the ladder truck from Bryan Fire Department Station 1, if it is available, is responded under the existing automatic aid agreement, *but at a considerable delay to fire attack efforts*. The average response time for Bryan Ladder 1 to the closest point of the College Station city limits is in excess of nine minutes.

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<sup>40</sup> There are more than 800 structures within the city limits where the roof or upper floors are beyond the reach of ladders carried in fire department engines. Typically, the longest ladder carried on engines is 24' in length, with a safe, effective vertical reach of 18'.



### **DEFICIENT STRENGTH OF FIRST ALARM ASSIGNMENT:**

Firefighting and rescue work is labor intensive, especially up to the time that all fire victims have been accounted for and the forward progress of the fire has been stopped. Fire data shows that the prompt response of a well staffed First Alarm Assignment, coupled with the proper tactical deployment of such personnel on the fireground utilizing modern firefighting apparatus and equipment is the prime determinant in the successful outcome of a structure fire.

A first alarm assignment for the College Station Fire Department consists of two (2) engine companies, one (1) quint or ladder company, one (1) ambulance, and one (1) chief officer. At current minimum shift staffing levels, a response of this type would provide twelve (12) personnel, six less than the National Fire Protection Association standard for medium-hazard occupancies.

Even in view of the fact that there are a number of recommendations in the plan to increase the firefighter response to first alarm assignments, the *design* and *type* of future fire apparatus purchases will significantly improve overall emergency service to the community. The following should be considered in this process:

1. The design of apparatus should provide for *safer* response to and operations at emergency incidents.
2. The design of apparatus should work toward a solution to the problem of *inadequate ladder truck* capabilities in the early stages of firefighting at structure fires.
3. NFPA 1901, *Standard for Automotive Fire Apparatus*, 1999 Edition

### **Staffing of Fire Apparatus**

Current minimum staffing of the Operations Division of the College Station Fire Department on any given shift utilizes 19 personnel as follows:

<b>Station 1</b>	Engine 721	3 personnel
	Ambulance 761	2 personnel
	Command 711	1 personnel
<b>Station 2</b>	Quint 752	3 personnel
	Ambulance 762	2 personnel
<b>Station 3</b>	Engine 723	3 personnel
	Ambulance 763	2 personnel
<b>Station 4</b>	Engine 724	3 personnel

The maximum number of personnel available for each shift is 24. In the provision of emergency services, a balance must be achieved between deploying the resources necessary to handle the “normal” (daily average) workload and those needed to control a major incident. This must be done while striving to meet accepted nationally recognized safety standards. If only those resources that are necessary to handle the normal workload are deployed, the community does not receive an effective response when the unanticipated occurs. However, no community can afford to keep in a state of readiness the vast resources needed for a major disaster. There is no formula for determining where the proper balance should be. Each community is forced to decide what resources it can afford and how much risk it is willing to accept.

Most often in our city, a single fire engine company is required for an emergency fire call. However, a large percentage of incidents, such as multiple vehicle accidents or life threatening emergency medical calls can require two companies, and all structure fire calls (regardless of size) require at least a full first alarm response of two engines, one aerial apparatus (ladder or quint), one ambulance and a chief officer. A major fire or mass casualty incident, such as the November '99 Bonfire tragedy, can require all the resources that the College Station Fire Department and neighboring departments can provide.

The College Station Fire Department believes that we must have the resources in place at each fire station to provide an adequate first response to the incidents we anticipate will occur with some frequency during the year. We also believe that resources must be available to handle these incidents as efficiently as possible while providing the highest level of safety for the citizens and department personnel.

There are two key elements in determining minimum staffing levels: defining “adequate first response” and providing maximum safety for department personnel.

### **Adequate First Response**

As stated previously, The National Fire Protection Association *Typical Initial Attack Response Standards* recommendation is as follows:

**High-Hazard Occupancies:** (Schools, hospitals, nursing homes, explosive plants, refineries, high-rise buildings, and other high life hazard or large potential occupancies)

At least four (4) engines, two (2) ladder trucks (or combination apparatus with equivalent capabilities),<sup>41</sup> two (2) chief officers, and other specialized apparatus as may be necessary to cope with the combustible involved; not less than twenty-six (26) firefighters and two (2) chief officers.

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<sup>41</sup> Such as pumper/aerial apparatus, “quints”, elevating platforms, etc.

**Medium-Hazard Occupancies:** (Apartments, offices, mercantile and industrial occupancies not normally requiring extensive rescue or firefighting forces)

At least three (3) engines, one (1) ladder truck, one (1) chief officer, and other specialized apparatus as may be needed or available, not less than eighteen (18) firefighters and one (1) chief officer.

**Low-Hazard Occupancies:** (One-, two-, or three-family dwellings and scattered small businesses and industrial occupancies)

At least two (2) engines, one (1) ladder truck, one (1) chief officer, and other specialized apparatus as may be needed or available; not less than fourteen (14) firefighters and one (1) chief officer.

The standard first alarm response for a structure fire call for a medium or low hazard occupancy by our department is 2 engines with 3 personnel each, one ladder or quint with 3 personnel, one ambulance with 2 personnel and one chief officer for a total of 12 personnel. A first alarm response for a high life hazard occupancy would receive an additional ambulance for a total of 14 personnel for this type call. Unfortunately, the Insurance Services Office<sup>42</sup> only gives half-credit for personnel assigned to ambulances, thus reducing, for ISO purposes, the number of personnel in first alarm responses to 11 and 13 respectively.

Although the City of College Station is not bound to nationally recognized standards such as those written by the National Fire Protection Association (NFPA) and the Occupational Safety and Health Administration (OSHA), except those adopted by the Texas Commission on Fire Protection (TCFP)<sup>43</sup>, the department does strive to meet suggested standards and recommendations. Current protective clothing, apparatus specification, self contained breathing apparatus program, firefighter annual health screenings, and fire station design follow or meet NFPA recommendations.

NFPA 1500, *Standard for Fire Department Occupational Health and Safety Programs- 1997*, recommends that a minimum acceptable fire company staffing level should be 4 members responding or arriving with each engine and ladder company. The rationale is simple. With the number of tasks to be performed at an emergency scene, firefighter safety is of utmost importance.

NFPA 1500 also clearly states that members working in hazardous areas shall operate in teams of 2 or more.

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<sup>42</sup> The Insurance Services Office Commercial Risk Services, Inc. evaluates the fire defense capabilities of communities throughout the "United States for insurance rate setting purposes. The insurance underwriters utilize the ISO services in determining the cost of fire insurance in a given community.

<sup>43</sup> The TCFP has adopted the following NFPA standards: NFPA 1971, *Standard on Protective Ensemble for Structural Firefighting*; NFPA 1981, *Standard on Open Circuit Self-contained Breathing Apparatus for the Fire Service*. TCFP recommends that fire departments use the following NFPA standards as guidelines: NFPA 1403, *Standard on Live Fire Training Evolutions*, NFPA 1500, *Standard on Fire Department Occupational Safety and Health Programs*.

"In the initial stages of an incident where only one team is operating in the hazardous area at a working structure fire, a minimum for four individuals is required, consisting of two individuals working as a team in the hazard area and two individuals present outside this hazard area for assistance or rescue at emergency operations where entry into the danger area is required. The standby members shall be responsible for maintaining a constant awareness of the number and identity of members operating in the hazardous area, their location and function, and time of entry. The standby members shall remain in radio, visual, voice, or signal line contact with the team."<sup>44</sup>

"One standby member shall be permitted to perform other duties outside the hazardous area, such as apparatus operator, incident commander, or technician or aide, provided constant communication is maintained between the standby member and the members of the team." "No one shall be permitted to serve as a standby member of the firefighting team when the activities in which he/she is engaged inhibit his/her ability to assist in or perform rescue, if necessary, or are of such importance that they cannot be abandoned without placing other firefighters in danger."<sup>45</sup>

"Once a second team is assigned or operating in the hazardous area, the incident shall no longer be considered in the 'initial stage,' and at least one rapid intervention crew shall be required."<sup>46</sup>

"As the incident expands in size or complexity, which includes an incident commander's requests for additional resources beyond a fire department's initial attack assignment, the rapid intervention crews shall upon arrival of these additional resources be either one of the following

- (a) On-scene crew members designated and dedicated as rapid intervention crews
- (b) On-scene company or companies located for rapid deployment and dedicated as rapid intervention crews."<sup>47</sup>

Occupational Safety and Health Administration Standards 29CFR 1910.134 and 29CFR 1910.156 (which address the requirements for workers who are actively conducting operations in atmospheres that are immediately dangerous to life and health) call for the team approach to fire ground operations and the use of the "two in-two out" rule. The "two in-two out" rule calls for standby personnel for each department member entering the hazardous area. OSHA also calls for a minimum of four firefighters to be involved in structural firefighting operations. A standby person is in the same level of personal protective equipment at the attack crew and is immediately ready to act in an emergency situation.

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<sup>44</sup> NFPA 1500, 6-4.4

<sup>45</sup> NFPA 1500, 6-4.4.2

<sup>46</sup> NFPA 1500, 6-4.4.4

<sup>47</sup> NFPA 1500, 6-5.5

An additional proposed standard, NFPA 1710: *Standard for the Organization and Deployment of Fire Suppression, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*, reinforces recommendations made by OSHA and in other NFPA standards.

In 1984, McManis Associates and John T. O'Hagan and the Dallas, TX, Fire Department jointly published the results of an evaluation of the effectiveness of different size fire crews in carrying out firefighting tasks. In the Dallas staffing study, three scenarios were utilized: an apartment building fire, a high-rise fire, and a single-family dwelling fire were simulated. Crews were observed and timed as they completed such tasks as search and rescue, placing hose lines in operation, and carrying out ventilation procedures. Ninety-one simulations were conducted using three, four, and five member firefighting crews.

The results of the Dallas study indicated there was a direct correlation between staffing level and quality of operation. Specifically, the study found "staffing below a crew size of four can overtax the operating force and lead to high losses."<sup>48</sup> The study also found that some assignments could be carried out acceptably by a three-member crew, but that other assignments taxed a four-member crew.

Specific problems arising from understaffing were:

- Delays in the performance of critical tasks, such as search and rescue, water application, ventilation, and exposure protection.
- Increased risk to the victims due to delay in set-up and task accomplishment.
- Reduction in the number of tasks performed by an operating crew.
- Loss of overall effectiveness resulting from compounded effects of delays in task performance and reduction in the number of tasks performed.
- Increased psychological stress on firefighters as they try to compensate for the lower level of staffing.
- Increased risk to the firefighter when aggressive procedures are undertaken without necessary support to complete assignments safely.

In 1991, TriData Corporation completed a management study for the City of Seattle, WA. This study was undertaken after a decade of increases in emergency calls and a dramatic increase in fire related dollar loss. To address the increase in calls and monetary losses, one recommendation from these consultants was to increase crew size from three to four on all engines that were

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<sup>48</sup> *Dallas Fire Department Staffing Level Studies*, December, 1991, p. 1-2

running three person crews. The rationale, as with NFPA recommendations, was simple:

- Three person crews took longer to perform tasks on the fireground, and
- Three person crews require that the company officer become involved in the physical tasks at the expense of supervision and overall Incident Command.<sup>49</sup>

Other fire service related organizations, such as the International Association of Firefighters (IAFF) and the International Association of Fire Chiefs (IAFC), have addressed the issue of minimum staffing. All recommend a minimum of four personnel on engines, with a minimum of four or five personnel assigned to aerial apparatus. ISO gives maximum credit for six personnel for each existing engine or ladder company.<sup>50</sup>

### **Staffing for Emergency Medical Services**

Approximately sixty-one percent of all emergency responses made by the College Station Fire Department involve emergency medical calls. Demand for emergency medical service is increasing by approximately 400 calls per year and the department has attempted to keep pace by assigning EMT-Paramedics to all first due fire apparatus and equipping them so advanced life support can be rendered. Even with the addition of a third first-run ambulance in October of 1999, there are numerous times when no ambulance is available within our city. The Paramedic Engine Companies are providing life saving measures while an ambulance is responding from a mutual aid service.

One of the most common emergencies to which we respond is the major motor vehicle accident. In addition to engine company personnel providing necessary emergency medical services, they are called upon to perform fire control, vehicle extrication, scene control, mitigation of any hazardous materials spilled, and other tasks associated with calls of this type. On many occasions a member of the engine crew is required to ride to the hospital in the ambulance to assist with necessary patient care. With three person crews, the engine has to be taken out of service due to insufficient staffing until the third crewmember can be retrieved from the hospital.

### **Recommendations**

Recommendations contained within this plan to further the distribution, staffing and response of firefighting and rescue resources to our growing community include the following:

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<sup>49</sup> NFPA, OSHA, and EPA standards all require the establishment of an Incident Command system and the use of a designated Incident Commander at the scene of all emergencies.

<sup>50</sup> Insurance Services Office, *Fire Suppression Rating Schedule*, ed. 6-80, Section 570, p. 23

- Implementation of 2 dedicated ladder companies to expedite completion of initial fireground ladder company functions and to address ISO and NFPA recommendations.
- Implementation of a Special Operations Squad to supplement staffing at major incidents and for response to special situations, such as hazardous materials releases, technical rescue situations, etc.
- Implementation of a 4<sup>th</sup> front line ambulance.
- Implementation of appropriate fire apparatus at Stations 5, 6, and 7.

## **Proposed Implementation Timeline- Preferred Option**

### **Personnel**

<b>FY '00-'01</b>	Addition of 7 personnel 3 personnel to complete staffing for 3 <sup>rd</sup> frontline ambulance 4 personnel to begin to address inadequacies in dedicated ladder company service. Staffing for a dedicated ladder company would be a <i>minimum</i> of 4 personnel
<b>FY '01-'02</b>	Addition of 10 personnel 4 personnel for 2 <sup>nd</sup> year of 3 year plan for staffing a dedicated ladder company. 6 personnel to begin 2 year staffing implementation for Station 5. (These personnel and an appropriate apparatus were addressed during the early stages of the Station 5 CIP.)
<b>FY '02-'03</b>	Addition of 10 personnel 6 personnel to fully staff Station 5. 4 personnel to fully compliment the dedicated ladder company
<b>FY '03-'04</b>	Addition of 6 personnel 6 personnel for implementation of Special Operations Squad.
<b>FY '04-'05</b>	Addition of 6 personnel. 6 personnel to begin 2 year staffing implementation for Station 6.
<b>FY '05-'06</b>	Addition of 18 personnel. 6 personnel to fully staff Station 6. 3 personnel for District Chief positions 9 personnel to staff 4 <sup>th</sup> ambulance.
<b>FY '06-'07</b>	Addition of 6 personnel 6 personnel to begin 2 year staffing implementation for 2 <sup>nd</sup> dedicated Ladder Company.
<b>FY '07-'08</b>	Addition of 6 personnel 6 personnel to fully staff 2 <sup>nd</sup> dedicated ladder company.
<b>FY '08-'09</b>	Addition of 6 personnel 6 personnel to begin 2 year staffing implementation for Station 7.
<b>FY '09-'10</b>	Addition of 6 personnel 6 personnel to fully staff Station 7.

### **Apparatus**

<b>FY '01-'02</b>	Contract for 100' ladder tower for dedicated ladder company Contract for appropriate apparatus for Station 5.
<b>FY '02-'03</b>	Contract for special operations squad vehicle.
<b>FY '04-'05</b>	Contract for appropriate apparatus for Station 6.
<b>FY '05-'06</b>	Contract for additional ambulance. Contract for District Chief vehicle.
<b>FY '06-'07</b>	Contract for additional ladder truck.
<b>FY '08-'09</b>	Contract for appropriate apparatus for Station 7.



## **Office of the Fire Marshal**

The Office of the Fire Marshal encompasses fire prevention and inspection, fire cause and origin determination, arson investigation, public education, premise code enforcement/community enhancement, and parking enforcement.

The current staffing consists of the fire marshal, two inspectors/investigators, a public education officer, three code enforcement officers, and 5 full-time equivalent parking officers.

The inspectors/investigators are responsible for assuring that new construction and occupancies meet all applicable fire and life safety codes and ordinances. This includes review of construction plans, numerous inspections during construction, testing of fire suppression and detection systems (for both new construction and existing occupancies), testing of underground storage tanks, and issuance of certificates of occupancies. Inspectors are also responsible for regular fire and life safety compliance inspections of existing commercial occupancies, and inspections necessary before the approval of an outdoor burning permit. They also provide information to the public on request and strive to resolve any citizen complaints. These inspectors are also the lead investigators for determining the cause and origin of all fires that occur within the city limits of College Station.

The Public Education Officer provides fire prevention and life safety information and classes to the public. This position is the point of contact with civic groups requesting programs and works closely with the College Station Independent School District coordinating activities for National Fire Prevention Week, the "D.E.A.D. (Drinking and Driving Ends All Dreams)" D.W.I. awareness program, and the "Risk Watch" program.

## **Immediate Needs**

### **Inspection**

The Fire and Life Safety Inspection program is of vital importance to the fire department and the citizens. The fire department has a responsibility to the citizens and visitors to our community to ensure that commercial occupancies offer a safe environment. The Office of the Fire Marshal has a responsibility to the citizens and suppression personnel to ensure that hazardous conditions are identified, reported to the suppression forces, and corrected in a timely manner.

The ISO recommends that a thorough inspection of all nonresidential structures should be performed at least annually<sup>51</sup>. Hazardous properties and properties with high loss-of-life potential<sup>52</sup> should be inspected more frequently. The City of

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<sup>51</sup> Insurance Services Office, Inc. "Fire Suppression Rating Schedule- Texas Exception", Ed. 2/95, p. TX-5

<sup>52</sup> Properties with high loss-of-life potential would include schools, hospitals, other long term health care facilities, hotels and motels, places of public assembly, etc.

College Station currently has approximately 1,200 existing nonresidential structures that encompass in excess of 1,800 businesses. The number of commercial occupancies is steadily increasing, and will continue to do so for several years.

ISO utilizes an average Daily Original Inspection Activity (D.O.I.A.) of two inspections per day for each inspector. The D.O.I.A. is based on inspections of entire structures and may include multiple occupancies. This equates to an annual output of 480 inspections per inspector.<sup>53</sup>

New or proposed construction requires that plans be reviewed, problems be identified and corrected, progress be inspected several times during the construction phase, any detection and suppression system tests be performed in a timely manner. A comprehensive final inspection is conducted before a Certificate of Occupancy (C.O.) can be issued. Monitoring new construction is a full time job of one inspector, leaving only one inspector to monitor and inspect existing occupancies.

There is an immediate need for the FY '00-'01 budget to address one additional inspector.

In order to facilitate record keeping and compliance, the department must move toward "pen pad" based inspection and investigation reporting, that is electronic field reporting with the capability of being downloaded into the record keeping system upon return to the administrative offices. Currently, inspection reports are completed by hand in the field and later entered into the record keeping system. Electronic field reporting would be more accurate, time efficient, and require less support staff service.

### **Public Education**

The demand for public education classes has been increasing, with several new programs currently in development. Some of the major projects are the "Risk Watch" program that will be expanding into all elementary schools in 2000, the "D.E.A.D. (Drinking and Driving Ends All Dreams)" D.W.I. awareness program that will become a bi-annual event, and the Citizens' Fire Academy (the inaugural class is currently underway). Coupled with the increase in requests for classes from local businesses and civic groups, it becomes necessary to consider the addition of a Public Education Assistant. This would be a part-time, seasonal position utilized for 20 hours per week during the public school year.

### **Transportation Issues**

The Public Education Officer currently shares the use of a vehicle (mini-van) with the Fire Training Coordinator and the EMS Training Coordinator. Because of increased mandates for in-house and continuing education training in fire and

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<sup>53</sup> 2 inspections per day X 20 days per month X 12 months per year

EMS and demand for public education programs and classes, more conflicts arise concerning the use of the available vehicle.

The needs of the Public Education Officer and the EMS Training Coordinator are similar, in that the vast majority of the equipment that they carry must be kept safe from the elements, therefore a minivan would be appropriate. The needs of the Fire Training Coordinator are more suited to a pick-up truck.

Each inspector (2) and code enforcement officer (3) requires a vehicle. Code enforcement officers need a pick-up truck as their duties include removing illegal signs for right-of-ways and removing discarded or abandoned trash or other materials.

The maximum number of parking enforcement officers on duty at any time is 3. Each officer needs a vehicle because of the large areas that they must patrol. Any small sedan would be appropriate for this duty.

## **Other Needs**

### **Parking Enforcement**

During the next 18 to 24 months, the City should explore privatization of the Northgate parking lot and garage. This could be in the form of an operation agreement or a ground lease.

Within 2 to 3 years (FY '02-'03) a position of Deputy Fire Marshal should be developed and filled. Growth projections indicate a steady increase in the number of commercial occupancies plus, as the department moves closer to meeting ISO recommendations, there will be an increase in inspection frequency. Also there will be an increase in built upon area in the city requiring premise code enforcement attention. This increase in workload will require more supervisory attention.

Additional support staff (half time) will also be warranted for additional clerical needs. Code enforcement personnel spend approximately 35% of their time on clerical duties. As demand for service and field time increases these clerical duties would be handled more cost effectively by support staff.

As more area is developed an additional code enforcement officer will be needed to meet demand for premise code enforcement. It is expected that this position would be requested in the FY '03-'04 budget. At this point the half time support staff position would be converted to full time.

If growth and development projections hold true, the need for a fire department plans examiner would be addressed in FY '04-'05.

## **Other Goals**

### **Codes and Ordinances**

The Office of the Fire Marshal should have an on-going program of review and appropriate revision of existing premise codes. Fire and Life Safety codes should be revised or new standards adopted as appropriate.

The adverse impact of false alarms from residential and commercial systems will be evaluated and recommendations made to the department administration.

### **Impact of New Technology**

The benefit and impact of advances in residential fire alarm technology and residential fire sprinkler systems will be evaluated. Recommendations will be made to the fire department administration.

Residential sprinkler alarms may have significant impact on homeowners' insurance rates, and also on ISO evaluation. Residential sprinklers may allow for greater fire hydrant spacing and longer cul-de-sac length. These benefits can only be realized if all residences in an entire fire demand zone or subdivision have residential sprinklers.

## **Impact of Technology on the Fire Service**

It has often been said that the fire service is proud of its "two hundred years of tradition unimpeded by progress." Actually, nothing is further from the truth. The fire service, as a whole, has always embraced innovation and new technology that has been proven to make the job more efficient, more effective and safer.

The fire department has an obligation to the City and its residents to be responsive to their needs and to meet these needs effectively and safely, while exercising superior fiscal judgement. Any new technology or possible improvement in the way we deliver services to the community must, and will be, researched, evaluated and embraced if it will improve the safety or quality of life for our citizens.

## **INFORMATION MANAGEMENT**

The public safety computer aided dispatch (CAD) and reporting system is the backbone of fire/EMS/police response. CAD recommends the closest available units that can respond to any emergency; fire, EMS, or police. Valuable, often critical, information is stored in CAD by location and can be used to forewarn emergency responders of unusual circumstances. Standard information, such as address cross streets, fire hydrant locations, "knox box" locations and emergency telephone numbers are available. Any notes added by the call taker or dispatcher are displayed. Any extra information that can be made available to emergency responders is welcome. With the installation and eventual complete activation of mobile data terminals in all emergency vehicles, any and all of this information will be accessible to personnel on demand, while en route or after arriving on scene.

Incident information and notes added by dispatchers during emergency incidents should transfer directly into the reporting system. This is a great time saver and would tend to contribute to consistent, accurate reporting. The Texas Commission on Fire Protection and the Texas Department of Health mandate reports for every incident to which the Fire Department responds. Data from these reports is also used to analyze demand for service to assist the department in providing the required services in the most timely and efficient manner.

The recordkeeping system should also be capable of tracking fire code inspection and fire investigation reports and integrating this information with premise information accessible through CAD from the mobile data terminals. The system should be compatible with the city's geographic information system in order to enhance data and call demand analysis.

The current public safety CAD and recordkeeping system is, by today's standards, antiquated, undependable, and requires constant attention in order to operate at all. Vendor support is virtually non-existent.

The public safety computer aided dispatch and reporting system is addressed in the current technology plan and a team is currently developing an RFQ.

## **TRAFFIC PREEMPTION**

Of the 91 firefighter fatalities in 1998 (the most current year for which complete statistics are available) seventeen, or 19%, were caused by collisions<sup>54</sup>. This is the second leading cause of firefighter death, following stress or overexertion.

The majority of these collisions occur at traffic intersections during firefighters' response to emergency calls. By preempting traffic signals to give responding units right-of-way, and to allow traffic to flow in the desired direction, the fire service can greatly reduce the possibility of these collisions and reduce drive times through more heavily traveled routes.

The City is currently implementing traffic preemption at selected intersections, but the eventual goal should be the installation of traffic preemption equipment at all controlled intersections. This equipment should be standard at all new intersection installations.

## **RAILROAD CORRIDOR MONITORING**

The fire department has been working with the Texas Transportation Institute's TransLink Research Laboratory on a spin-off program of the TransLink traffic signal preemption project. The focus of the program is live monitoring of train traffic along the Wellborn Road corridor.

Emerging technology being developed by the TransLink Lab has the capability to make travel routes for emergency apparatus train free. Using radio frequency Doppler radar equipment to monitor trains along this corridor, the system can display the length of the train, its speed and distance from each highway-railroad intersection (HRI), its estimated time of arrival (ETA) and estimated time of departure (ETD) from each intersection.

The information this system provides will let responders be more proactive and predictive in choosing a route. Installed in a fire station, a computer display will let responders decide which route would be the most time efficient. Eventually the information could be displayed on mobile data terminals in the apparatus to provide real-time information during responses.

Displays in the dispatch office would allow dispatcher's to send units from alternative stations if necessary. Knowing the ETA and ETD of trains at all of the city's HRIs, dispatchers can send other apparatus and responders along clear routes by crossing HRIs already passed or yet to be entered by the train.

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<sup>54</sup> *Firefighter Fatalities in the United States in 1998*, United States Fire Administration, Federal Emergency Management Agency, August, 1999

## **FIREFIGHTER ACCOUNTABILITY**

The issue of firefighter accountability, that is tracking the whereabouts all personnel at an emergency scene, has been a major focus for firefighter safety in recent years. Major regulatory agencies, such as OSHA and the EPA, have issued requirements for firefighter accountability and rapid intervention rescue crews.

Technology is available to electronically track the location of each individual firefighter by global positioning satellites. Current released technology only allows pinpointing locations to within approximately ten meters, but the U.S. military can track to within one meter. When this level of technology is released to the public, firefighter safety on-scene will increase dramatically.

Although untried in the field, radio triangulation technology has similar applications for firefighter accountability. With a cost of approximately \$150 per firefighter and \$5,000 per apparatus, this technology may be more affordable than GPS systems.

Bar coding has great potential for use in firefighter safety. All pertinent information for a specific firefighter could be coded and placed in or on their protective clothing. Upon arrival at a scene, the accountability sector officer could "scan" the firefighter and immediately know: who it is; their rank; what station and company the person is assigned to; what their level of training is for EMS, hazardous materials response, or other special skills; and all medical history and emergency contact information.

Protective helmets will incorporate hands-free communication devices that will also monitor biological data of the wearer, such as pulse and respiration rates and body temperature. This will allow the incident safety officer to identify personnel who should be rotated to the rehabilitation sector before they fall victim to exhaustion.

## **THERMAL IMAGING**

Thermal, or infrared, technology has been available to the fire service for a few years and shows tremendous potential for search and rescue and fire suppression applications.

The lack of visibility during structure fire suppression activities has always been a major obstacle to rapid, accurate search, either for lost or trapped victims or for the seat of a fire. Thermal imaging is a major technological advancement that will have tremendous influence on these operations. Not only does this

technology allow firefighters to "see" through smoke and in total darkness, it also allows them to detect fires or hot spots in hidden areas or inside walls.

Thermal imaging equipment will be, at some point, a standard item of personal protective equipment. It is entirely possible that this technology will be mandated as required issue.

## **PERSONAL PROTECTIVE EQUIPMENT**

There is no more important mission for the fire department than to provide the safest possible working conditions for our firefighters. It is incumbent upon us to constantly research and investigate new products and advancements in personal protective equipment.

New materials are available for protective clothing outer shells, thermal liners and vapor barriers. When products are identified that offer significant improvement in safety for our personnel we must plan to provide them within our fiscal restrictions.

Self-contained breathing apparatus have undergone much advancement in recent years. The department will evaluate these newer units and determine if we should enter into a multi-year program to replace our current equipment.

As previously stated, technology such as GPS location and thermal imaging are in the future of personal protective equipment. Above all other innovations, these have the potential of having the greatest impact on the safety of our emergency responders.

## **TRAINING TECHNOLOGY**

As the fire department expands to meet the service demands of our growing community, resources will be stationed at more appropriate and advantageous locations throughout the community. This increases the difficulty of providing mandated training for all personnel. It becomes increasingly difficult to bring stations together for training without leaving significant areas of the city unprotected.

One way to meet this challenge is through multi-media, interactive training classes that are produced in-house and distributed to all stations. This technology is readily available and would be cost effective for a large portion of the in-service training required by the Texas Commission of Fire Protection and the Texas Department of Health. Classes of this type would offer more delivery flexibility in that each station could schedule classes around their own individual scheduled activities and emergency responses. Classes could be distributed on



compact disk or made available over the Internet or the city's Intranet. These classes could possibly be made available to the stations over the local franchise cable system.

With the volume of mandated continuing education hours that we are required to provide to our personnel to maintain certifications in a multitude of disciplines, there is a need for a training/education assistant to work with the fire training and emergency medical service training coordinators. If companies are to remain in service within their assigned response districts, each training class must be delivered twelve times, once at each of the four fire stations on each of the three shifts. This can mean that it takes a full week or more to complete a rotation for one class without scheduled make-up classes for personnel who were on leave.

## **Administrative Concerns**

This section of the ***Fire Protection Master Plan*** addresses the broad picture of overall department operations and functions. It addresses what is needed to bind all the individual pieces together into a department that can deliver the level of services that the citizens require and expect.

### **INFORMATION MANAGEMENT**

This topic has been discussed in previous sections. The information management and record keeping system is the major tool that the department administration has to evaluate performance from the service delivery or fiscal standpoints.

Data gathered through the CAD system during responses should allow us to evaluate response, reaction, and drive times. It should allow us to calculate the total time spent on emergency responses and thereby better determine the actual cost of service delivery. This information should allow us to identify service demand areas to provide more appropriate distribution of resources throughout the community.

Information entered through the reporting system should allow us to analyze trends in the type of calls to which we respond. This is instrumental in determining the course of our prevention and public education programs.

This information, to a certain extent, should allow us to evaluate the performance of our personnel on emergency scenes and provide narrative information detailing actions taken and tasks performed.

The information system must be comprehensive enough to also track non-emergency information, such as fire and life safety inspections and incident investigations.

The lack of supporting data decreases the fire department's ability to secure alternative funding.

The current public safety CAD and recordkeeping system is, by today's standards, antiquated, undependable, requires constant attention to operate at all, and vendor support is non-existent.

The public safety computer aided dispatch and reporting system is addressed in the current technology plan and a team is currently developing an RFQ.

## **MAINTENANCE OF TECHNOLOGY**

As the fire department, and the City as a whole, becomes more dependent on technology, it will become more challenging to maintain. A sophisticated, complex, comprehensive reporting and recordkeeping system is a tremendous tool of the management of any city department, but, as with any other complex system, there is a requirement for periodic maintenance and upgrading. There must be someone who can develop the system so it will provide the information required by management.

Mobile data terminals that are used in all city public safety vehicles (fire, EMS, and police) will require software and hardware maintenance. Traffic preemption equipment must be maintained. EMS equipment is becoming more sophisticated and will present the same, or similar, maintenance problems.

## **OPERATIONS SUPPORT SERVICES**

As more, newer apparatus are purchased, vehicle maintenance will increase proportionally. Vehicles will become more technologically complex and require dedicated maintenance facilities and personnel.

As the department grows to meet the service demands of a growing community, the logistics of providing equipment and supplies will increase. Specification, procurement, inventory, storage and tracking of vehicle and personal protective equipment, uniforms, janitorial supplies, etc., will require an expanded storage facility and a full time quartermaster.

## **TRAINING REQUIREMENTS**

The fire department has been fortunate in having the Texas Firemen's Training School within our primary response area. We have been able to utilize those facilities for training purposes in a reasonably cost effective manner.

With the increasing staffing levels in our department and with increasing student levels and changing policies at FTS, it will become increasingly difficult to find a suitable number of consecutive days during which the training projects we require are available. This is leading to greatly reduced opportunities for live drills.

One solution would be to purchase services from FTS at their market rate. This would require increasing the department's fire training budget by several hundred percent.

Another solution would be for the department to obtain its own fire/haz mat training facility at a cost that could approach \$2 million dollars.

As staffing is increased to meet service demands the department incurs initial training expenses. As the need for the department is for incoming employees to be state certified basic structure firefighters (TCFP mandate) and state certified EMT-paramedics (Department mandated) new employees may need to be trained in one or both areas.

The cost for firefighter training including base salary, overtime, and tuition is approximately \$8,500. The cost to certify a firefighter as an EMT-P is approximately \$7,000.<sup>55</sup>

## **RECRUITMENT AND RETENTION**

In recruiting new employees it is definitely to the department's benefit to hire someone who already possesses both required certifications. We are able place these employees in stations in a much more timely manner.

Entry level employees with this amount of training are difficult for our department to recruit. We are in competition with departments in the larger metropolitan markets of our state and cannot compete in the salary area. Several times we have experienced a situation where a new employee is with our department long enough to receive training and become firefighter and EMT-P certified only to move to another department with a substantially higher entry-level salary.

It is our hope that the recent salary adjustments will help in this area.

## **SUPPORT STAFF**

Increased production in all divisions will necessitate augmentation of support staff services.

Growing numbers of citizen inquiries to the Community Enhancement Office, coupled with the addition of two enforcement officers to serve expanding areas of the city will require dedicated support staff.

The addition of two Fire Prevention Officers to meet the demands of new construction and fire/life safety inspections of existing occupancies will also necessitate additional support staff. This support position will also be the initial contact point for the Public Education Office.

Current support staff will be dedicated to department administrative support: staff assistant/payroll; senior secretary/EMS billing; secretary/receptionist/accounts payable.

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<sup>55</sup> This figure is based on an in-house course with a minimum of 8 students and includes all salaries, overtime, and testing and certification fees.

## **ALTERNATIVE FUNDING SOURCES**

Almost all city departments are faced with the same challenges when it comes to financing services to the citizens. The citizens of any community have expectations, and justly so, of receiving necessary basic services at the lowest cost possible. Many communities have been impacted by the will of the people through tax rollback initiatives and other demands for tax relief.

A quality service delivered as efficiently and cost effectively as possible is the mission of the College Station Fire Department. Unfortunately, no services can be delivered without funding. Therefore it is responsibility of the College Station Fire Department to investigate and cultivate alternative funding sources.

### **Federal Assistance**

Much to the disappointment of fire and emergency services across the nation, the federal government provides less than 3-tenths of one percent (0.3%) of the funds available to law enforcement to the fire service. There is an attempt to address this inequity before Congress at this time.

For the second time, Congressman Bill Pascrell, Jr. (D-NJ) has introduced the "Firefighter Investment and Response Enhancement (FIRE) Act", H.R. 1168. This bill would provide \$1 billion in matching fund grant monies per year for the next 5 years. These funds would be available to any community for virtually any purpose associated with the delivery of emergency services. These funds could be used for training, facilities, apparatus and equipment, or the addition of personnel. This would be an encouraging sign to communities, large and small, that Congress recognizes the struggle they face when expected to bear the sole burden of maintaining a modern fire and rescue service.

This bill currently has sufficient cosponsors to pass and has been scheduled for public hearing in mid April. As the 2000 session begins, it is questionable whether any further action will take place concerning H.R. 1168, but we will continue to support this legislation and monitor its progress.

Parallel legislation has been introduced in the US Senate, but action on any fire service funding legislation is doubtful. President Clinton's proposed budget does not provide any additional funding of the fire and rescue service.

A budget appropriation amendment providing \$100 million in 50/50 matching grant funds for the fire service has passed in the House. The fate of this amendment in the Senate is still unknown.

### **State Assistance**

The only funds available at the state level for fire departments are actually federal funds that are administered by state agencies. The Division of

Emergency Management, Texas Department of Public Safety, has this responsibility for our state. These funds are exclusively for training personnel. In recent years the training emphasis has been in Emergency Management and Weapons of Mass Destruction.

Our department utilizes these funds on a yearly basis by arranging for DEM to hold classes locally. When possible, personnel are enrolled in DEM classes offered in other locations.

## **LOCAL ALTERNATIVES**

As local fire and EMS services struggle to finance the provision of demanded services, several alternatives at the local level have been developed.

### **Fee for Service**

The College Station Fire Department has been utilizing this program for several years, predominately in the prevention division. Services such as testing sprinkler, alarm, and suppression systems and inspecting certain occupancies, such as day care and health facilities, require a user fee. This could be expanded to include annual fire and life safety inspections required for all commercial occupancies.

The department also recovers costs incurred for mitigation of major hazardous materials incidents. Actual costs of expendable materials, apparatus and equipment usage, and personnel are billed to the responsible party.

Some funds for services rendered in connection with DWI/DUI incidents are recovered, but this is a negligible amount.

These “fee for service” programs usually operate on a “break even” basis.

This program could be expanded to include a fee charged by Texas A&M to all students. This “public safety” or “fire protection service” fee would become part of the registration process. A \$10 per student per regular semester and \$5 per summer semester fee could easily generate \$1 million per year.

### **Subscription Service**

Many departments employ a subscription service in their delivery areas. This is predominately used by volunteer departments as a means of supplementing funding and to shift the burden of operational costs to those citizens who utilize services.

Citizens are encouraged to pay a subscription fee. If that particular citizen requires service (ambulance transport for example) there is no additional fee assessed or the assessed fee for service is substantially reduced.

## **Special Tax**

Oklahoma City, OK utilizes a "Special Police and Fire Tax", a 0.75% sales tax that can only be used for fire and police services. This is not an option for our department as our area already collects the maximum sales tax allowed by law (8.25%).

In some areas developers are assessed so much per unit of development. This is similar to an impact fee and can be assessed by residential lot, apartment, square footage of commercial space, etc.

Building Permit Fee- a "Public Safety" fee is added to each building permit, either a set amount (\$5/per) or a sliding scale based on permitted value

"Public Safety Assessment" - fee added to local property tax. Flat fee per residence or prorated fee based on assessed value (Example: written insurance exposure for our primary response area is \$9 billion +/-; assessment of \$.50 per \$10,000 insured value would yield \$450,000; average homestead of \$111,585 would be assessed \$5.58 annually)

## **Other Grant Programs**

The Texas Commission of Fire Protection has a grant and loan program that is based on demonstrated need. Although the department has previously applied for grants through this program, we have never received funding. It is doubtful that we would ever receive funding through this program because of the city's extremely low tax rate.

There are numerous private foundations that make grants for a wide variety of projects and programs. The possibility of obtaining grant funding for public education programs or programs that target a specific prevention need is good, but the program would need to fit the criteria specified in the grant offering.

## **Site/Land Dedication/Donation**

Developers currently are required to dedicate land for parks based on area being developed. This should also apply for, or be expanded to include, fire/EMS facilities.

## **Fund Raisers**

Some major retailers have fund raising programs in which our department could participate. Usually there are specific requirements for this type of program and we would have to meet the criteria.

## Glossary of Terms

<b>Aerial Ladder</b>	A large ladder mounted to an apparatus that requires mechanical means of operation.
<b>Aerial Device</b>	An elevating device mounted to an apparatus that requires mechanical means to operate. An aerial device could be: <ol style="list-style-type: none"><li>1. A ladder.</li><li>2. A ladder tower.</li><li>3. An articulating boom.</li></ol>
<b>Engine Company:</b>	An engine is a vehicle designed with a fire pump capable of pumping 750 to 2,000 gallons of water per minute when connected to a continuous water supply; a water tank that will carry 500 to 1,000 gallons of water on board where mobile firefighting is required; and 1,500 to 2,000 feet of supply/attack hose. The engine also carries a 24' ladder as well as roof and attic ladders, and a variety of other firefighting tools and equipment used by firefighters in controlling a fire. Staffed with a given number of firefighters, the unit is referred to as an <i>engine company</i>
<b>Engine Company Tactical Operations</b>	. Fire attack operations for engine companies would include the laying of a water supply hoseline from the nearest hydrant to a position in close proximity to the building fire. Firefighters then don self-contained breathing apparatus, prepare the hydrant supply hoseline and fire attack hoselines for waterflow, and prepare for entry into the fire building. The Engine Company would advance hoselines to tactical positions to cut off fire extension to adjacent exposed buildings and to other rooms or floors within the fire building and extinguish the fire. As with all other companies operating on the fireground, engine companies would initiate search and rescue efforts as they move through the building, but it is the prompt placement of hoselines that ensures the safety of fire victims until they can be located and removed to an area of safety. An Engine Company would also be assigned as a Rapid Intervention Crew.
<b>First Alarm Assignment</b>	Number and type of apparatus designated for initial response to a report of a fire in a structure or other major emergency.
<b>Flashover</b>	Situation that may develop during a confined-space fire where all combustibles appear to ignite simultaneously.



This usually occurs when the ceiling temperature reaches between 850° F and 1100° F, which is usually 8 to 10 minutes after initial ignition.

**IAFC** International Association of Fire Chiefs

**IAFF** International Association of Firefighters

**IC** Incident Commander. The sole person responsible for command and control of any emergency incident.

**ICS** Incident Command System

**ISO** Insurance Services Office, Inc.

**Ladder Company** See "**Truck Company**"

**NFPA** National Fire Protection Association

**OSHA** Occupational Safety and Health Administration

**PPC** Public Protection Classification

**PPE** Personal Protective Equipment

**Quint** A fire apparatus which has five basic equipment components

1. a large capacity (at least 750 gallon-per-minute) fire pump.
2. A water tank with at least 500-gallon capacity.
3. Fire hose.
4. Ground ladders.
5. An aerial device or ladder.

**Rapid Intervention Crew** Tactical crew of at least two firefighters who are assigned for rescue of other firefighters working at a structure fire.

**Response Time** Time interval from when a call for assistance is received by the dispatcher and the appropriate units arrive on-scene. This included call processing , alerting of appropriate units, turnout time, and drive time.

**SCBA** Self-Contained Breathing Apparatus

**Set-up Time** Time interval between arrival of units on the scene and when crews are ready to begin tactical operations.

**Strategy** Overall plan of action.

**Tactic** Tasks that must be accomplished to achieve strategic objective.

**TCFP** Texas Commission of Fire Protection

**TDH** Texas Department of Health

**Truck Company:** A ladder truck is a vehicle designed with a hydraulically raised ladder that provides the dual function to firefighters of allowing access to higher levels of a building, as well as providing an elevated master stream for fire control purposes. Ladder trucks (often referred to as “trucks” or “truck companies”) are also designed with large amounts of compartment space to enable the apparatus to carry a great deal of specialized equipment that cannot be carried by the engine companies. Trucks carry a complement of portable ground ladders, fans for smoke removal, electrical generators, lighting equipment, a wide variety of hand tools and rescue equipment, forcible entry tools, as well as salvage/property conservation/overhaul equipment. Staffed with a given number of firefighters, this unit is known as a *truck company* or *ladder company*.

**Truck Company Tactical Operations** The tactical responsibility of a Truck Company at a building fire is to place the ladder truck in a position of tactical advantage near the fire building. Truck company members don self-contained breathing apparatus and, with the appropriate tools in hand, force entry into the building for the engine companies. The truck members immediately begin search and rescue operations<sup>56</sup> while the engine companies advance fire streams into the building to control the spread of fire. Truck members also terminate the electrical/gas service to the building; place ladders for rescue and roof operations, provide ventilation of fire gasses to reduce the chance of flashover and to enable rescue operations to be carried out; provide support to engine companies by opening walls and ceilings, as well as provide powerful elevated water streams for exposure protection and fire control. The proper utilization of truck companies can not only affect the outcome of the fire and influence the safe removal of fire victims from the building, but also has a

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<sup>56</sup> While carrying out search and rescue efforts, truck members are not encumbered by hoselines and can move quickly throughout the fire building in their attempt to locate and remove trapped or overcome victims.

tremendous impact on overall firefighter safety when they are engaged in rescue and fire combat operations.